

CONTROLLED RELEASE SOCIETY

CRS 2023

#CRS2023

ANNUAL MEETING & EXPOSITION

JULY 24-28, 2023

THE FUTURE OF DELIVERY SCIENCE
Paris Hotel » Las Vegas, NV, USA

FINAL PROGRAM



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WELCOME TO CRS 2023

Cheers!



Laura Ensign Ph.D.

CRS Annual Meeting Program Chair

Marcella E. Woll Professor of Ophthalmology
Professor of ChemBE, BME, Pharm & Mol Sci, GynOb, ID, Oncology
Vice Chair for Research, Wilmer Eye Institute
The Center for Nanomedicine

On behalf of the Controlled Release Society (CRS) Annual Meeting Program Committee and the Board of Directors,

I am thrilled to invite you to join us for the CRS 2023 Annual Meeting and Expo being held at Paris Hotel, Las Vegas, Nevada July 24-28, 2023. The conference theme is “Advanced Delivery Science”, which reflects our focus on cutting-edge research and innovation across our strong discipline that will keep you up-to-date with new science and inspire new ideas. Most importantly, this event offers you the opportunity to network, form friendships among your peers, and foster new collaborations.

We have a full and exciting program over the conference duration with highly prominent plenary talks, technical sessions covering a wide scope of topics, industry led workshops and technical forums. We also have robust interaction with our exhibitors and sponsors with plenty of opportunities to network across our social events. The conference has numerous activities from our special interest groups, such as the Focus Groups, Young Scientists, Women in Science, Consumer and Diversified Products, and more, taking place before, during and after the main conference.

We look forward to seeing and hosting you in Las Vegas! Please let us know if you need more information or if there is anything we can do to help!

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CRS Headquarters Team is Ready to Serve You!

CRS headquarters team members value current members, future members, partners and programs & meetings attendees. Our goal is to consistently provide you with outstanding service, products, and programs. Utilize this reference list to connect with the relevant team members who can offer support in specific areas where you require assistance.

Our regular office hours are Monday through Friday from 8:00 AM - 4:30 PM Eastern Time (13:00 - 21:30 GMT/UTC). You can also leave a voicemail or email our general inbox at any time. We look forward to hearing from you!

GENERAL INFORMATION

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General Meeting Information

ALL EVENTS WILL TAKE PLACE AT THE PARIS HOTEL LAS VEGAS, NEVADA, UNITED STATES, JULY 24-28, 2023.

REGISTRATION HOURS

The registration desk will be open daily from 7:00 AM – 7:00 PM*

USE OF CRS SCIENTIFIC PROGRAM CONTENT

Information presented during the 2023 CRS Annual Meeting & Exposition is the property of CRS and the presenter. Information may not be recorded, photographed, copied, photocopied, transferred to electronic format, reproduced, or distributed without the written permission of CRS and the presenter. Any use of the program content, which includes, but is not limited to oral presentations, audiovisual materials used by speakers, and program handouts, without the written consent of CRS is prohibited.

SPEAKER READY ROOM HOURS

- Monday, July 24: 7:00 AM – 7:00 PM*
- Tuesday, July 25: 7:00 AM – 7:00 PM*
- Wednesday, July 26: 7:00 AM – 7:00 PM*
- Thursday, July 27: 7:00 AM – 7:00 PM*

The Speaker Ready Room is located in the **Loire Room**. All speakers are requested to check in at least 2 hours prior to their presentation (schedule permitting). Verification of proper performance in the Speakers' Ready Room is essential, particularly if video and animation is included in the presentation.

ACCESS THE ABSTRACTS

CRS Annual Meeting abstracts can easily be accessed on the CRS Meeting App. Within the app, click on the Abstracts icon to begin viewing poster abstracts, and view podium abstracts directly from the schedule. The abstracts will be available on the CRS website after the meeting.

ELECTRONIC DEVICES

As a courtesy to other meeting attendees, please turn off or silence all electronic devices during all workshops, sessions, and presentations.

PHOTOGRAPHY

Photography is not permitted in the session rooms, exhibit hall, or poster sessions.

PHOTO RELEASE

By virtue of your attendance, you agree to the Controlled Release Society's use of your likeness in promotional media.

CHILDREN AND THE CRS ANNUAL MEETING & EXPOSITION

The CRS Annual Meeting & Exposition is a professional, scientific meeting. CRS does not permit anyone under the age of 18 to attend the scientific sessions, poster sessions, exposition, and social events. For safety reasons, only registered exhibitors and poster presenters are permitted in the exposition/poster hall during set-up and take-down hours. Anyone 18+ must register and buy applicable individual tickets if not attending/registering as a student.

CRS ANTITRUST POLICY

It is the undeviating policy of the Controlled Release Society (CRS) to comply strictly with the letter and spirit of all U.S.A. federal laws, as well as state, and applicable international trade regulations and antitrust laws. Any activities of CRS or related actions of its staff, officers, trustees, or members that violate these laws and regulations are detrimental to the interests of CRS and are unequivocally contrary to CRS' policy. The implementation of the antitrust compliance policy of CRS shall include, but not be limited to the following:

- All the association activities or discussions shall be avoided that might be construed as tending to: (1) raise, lower, or stabilize prices; (2) allocate markets; (3) encourage boycotts, (4) foster unfair trade practices; or (5) in any way violate U.S.A. federal, state, or applicable international trade regulations and antitrust laws.
- No officer, director, or member of CRS shall make any representation in public or in private, orally or in writing, that states, or appears to state, an official policy or position of CRS without specific authorization to do so.
- CRS members, officers, or directors who participate in conduct that the Board of Directors, by a two-thirds majority vote, determine to be contrary to the CRS Antitrust Policy shall be subject to disciplinary measures up to, and including, termination.

EXHIBITS

The exhibits are an integral part of the complete education experience and features the latest in research products in the field of controlled release. The exhibit hall is open daily at 8:00AM and closes after the last event each day. The main times to expect activity in the Exhibit Hall are below. Please make time during the meeting to visit the exhibits during their open hours.

Installation Monday, July 24: 2:00 pm – 4:30 pm*
Tuesday, July 25: 8:00 am – 4:30 pm*

Exhibit Hours **TUESDAY, JULY 25**
Welcome Reception | 7:00pm - 9:00pm*
WEDNESDAY, JULY 26
AM Break | 10:00 am – 11:00 am*
(coffee & lite bites provided)
Chat & Chew | 1:00 pm – 2:00 pm (box lunch)*
PM Break | 4:00 pm – 4:30 pm*
(coffee & lite bites provided)
Exhibits & Poster Pub | 7:00 pm – 9:00 pm*
(food & beverages provided)

*All times listed in Pacific Daylight Time

General Meeting Information (continued)

Exhibit Hours **THURSDAY, JULY 27**
AM Break | 10:00 am – 11:00 am*
(coffee & lite bites provided)
Chat & Chew | 1:00 pm – 2:00 pm (box lunch)*
Exhibits & Poster Pub | 5:00 pm – 6:00 pm*
(coffee & lite bites provided)

Dismantle Friday, July 28: 8:00 am – 12:00pm*

Poster Installation **TUESDAY, JULY 25**
4:00 pm – 6:00 pm*
(installation must be complete by 6:00 pm)

Presentation/ Judging Times **TUESDAY, JULY 25**
Welcome Reception | 7:00 pm – 9:00 pm*

WEDNESDAY, JULY 26
Exhibit Hall, Posters, CV on a Poster – Job Fair
(place your CV on your poster for job opportunities) | 10:00 am – 11:00 am*

Exhibition Hall Chat & Chew | 1:00 pm – 2:00 pm
Exhibits & Poster Pubs | 6:30 pm – 8:30 pm

THURSDAY, JULY 27
Exhibit Hall & Posters | 10:00 am – 11:00 am*
Exhibition Hall Chat & Chew | 1:00 pm – 2:00 pm
Exhibits & Poster Pubs | 5:00 pm – 6:00 pm

Dismantle **THURSDAY, JULY 27** | 6:30 pm – 8:00 pm*
FRIDAY, JULY 28 | 8:00 am – 10:00 am*
(If your poster is not collected by 10:00 am on Friday, July 28, it will be discarded)

POSTER SESSIONS

Posters are located in the Exhibit Hall. All posters must be removed during Poster Breakdown or they will be discarded. The poster viewing area will be secured overnight. Photographing posters is not permitted.

The posters sessions are an important educational event of this meeting. We hope you support and attend these scientific presentations. Poster presentations will be separated by areas of expertise to guide you by your individual or group interest.

*All times listed in Pacific Daylight Time

2023 CRS Awards & Recognition

Congratulations to the 2023 Award Winners!

Congratulations to the 2023 Award Winners! CRS proudly announces the recipients of Awards that honor those who have contributed to the CRS society and science. Awards will be presented during the 2023 CRS Annual Meeting.

DISTINGUISHED SERVICE AWARD



Hamid Ghandehari, PhD
University of Utah

TRANSDERMAL DELIVERY KYDONIEUS FOUNDATION AWARD



Mark Prausnitz, PhD
Georgia Institute of Technology

RISING WOMEN IN SCIENCE AWARD



Laura Ensign, PhD
Johns Hopkins University

FOUNDERS AWARD



Justin Hanes, PhD
Johns Hopkins University

JOURNAL OF CONTROLLED RELEASE BEST PAPER AWARD

Sarah Hedtrich, PhD
University of British Columbia and Berlin Institute of Health at Charité



Henwei Huang
Harvard Medical School
“An automated all-in-one system for carbohydrate tracking, glucose monitoring, and insulin delivery”

MEMBER OF THE YEAR AWARD



Hagar Labouta, PhD
University of Manitoba

WOMEN IN SCIENCE AWARD



Maria Vicent, PhD
Centro Investigación Príncipe Felipe, CIF

SAMYANG AWARD IN HONOR OF SUNGWAN KIM



Samir Mitragotri, PhD
Harvard University

YOUNG INVESTIGATOR AWARD



Amirali Popat
University of Queensland, Woolloongabba

DRUG DELIVERY AND TRANSLATIONAL RESEARCH BEST PAPER AWARD



Matt Appell
Johns Hopkins University
“A hypotonic gel-forming eye drop provides enhanced intraocular delivery of a kinase inhibitor with melanin-binding properties for sustained protection of retinal ganglion cells”



James Moon, PhD
University of Michigan, Ann Arbor

CRS COMMITTEE MEETINGS

TUESDAY, JULY 25	TIME	ROOM
IAG/IFC Meeting	9:00 AM – 10:00 AM	Burgundy
IC Board Meeting	10:30 AM – 11:30 AM	Chablis
DDTR Meeting	12:00 PM – 1:00 PM	Bordeaux
ADDR Editorial Board Meeting	1:00 PM – 2:00 PM	Burgundy

WEDNESDAY, JULY 26	TIME	ROOM
CRS Diversified Products Board Meeting	8:00 AM – 9:00 AM	Burgundy
JCR Editor's Meeting	12:00 PM – 1:00 PM	Burgundy
JCR Board Meeting	1:00 PM – 2:00PM	Burgundy

THURSDAY, JULY 27	TIME	ROOM
IAG/IFC Meeting Part II	2:00 PM – 3:00 PM	Burgundy



who advances
drug delivery?
—
we do.

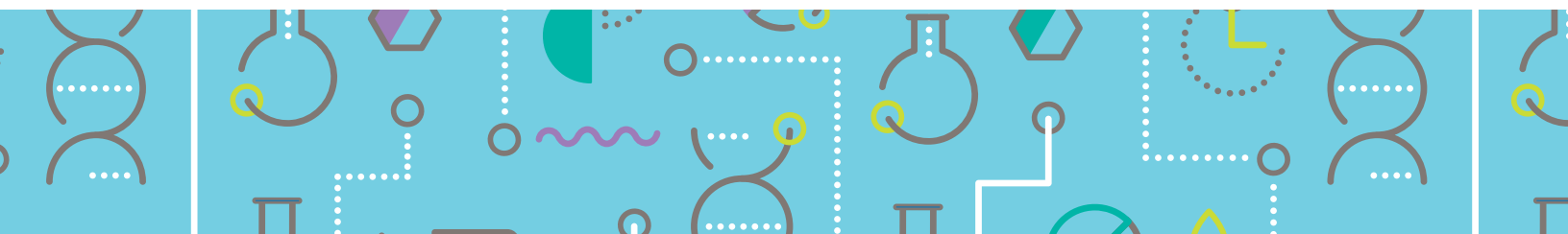
Delivering a drug when and where it's needed results in better outcomes for both manufacturers and patients. Ashland is a global leader in excipient technologies for long-acting injectables (LAI) and oral controlled release formulations including both standard GMP grades and custom polymers. We offer binders, disintegrants, coatings and bioresorbable polymers that facilitate hot melt extrusion, particle and pellet coating, drug layering, matrix tablets, microsphere/nanoparticle production and release profile prediction/simulation. Stop by booth 206 and let's talk about how we can help you with your formulations.

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PROGRAM

Pre-Meeting Workshops

MONDAY, JULY 24, 2023

Full Day Workshop: Basic Concepts of Oral Drug Delivery; What You Need to Know, What I Wish I Knew When I Started Many Years Ago and Paid the Price for Not Knowing

Part 1: 8:00 AM - 12:30 PM & **Part 2:** 1:30 PM to 5 PM
Champagne 3 & 4

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Members of the CRS often comment that the Society has helped them in many ways but first and foremost in exposing them to the collective knowledge of its members. Newcomers or those not familiar with specific technologies, usually find the meetings confusing, in particular if they are used to “focused” meetings. As an example, a polymer scientist developing a product that might be useful in the CR context might have little or no knowledge about the physiological conditions his/her polymer might encounter after ingestion. Conversely, a clinician with a problem that may be solved with CR might know little or nothing about materials sciences or CR technologies. This workshop attempts to give an oversight covering the “usual (known to us) unknowns” in the area of oral drug delivery.

Since the CRS is multidisciplinary, the focus will be on first timers, newcomers or those interested in oral drug delivery that come from different disciplines. The Workshop will give a high-level insight into oral controlled release technologies, potential resources for further help and a general overview of the oral controlled release landscape.

Speaker: Ali Rajabi-Siahboomi, Colorcon, USA

Speaker: Daniel Treffer, Meltprep, USA

Speaker: Firouz Asgarzadeh, Bioduro-Sundia, USA

Speaker: Randal Mrsny, Bath University, UK

Speaker: Inayet Ellis, Gattefossé, USA

Speaker: Anette Mullertz, University of Copenhagen, Denmark

Speaker: Anisul Quadir, Shin-Etsu, USA

Speaker: Inayet Ellis, Gattefossé, USA

Speaker: Sandip Tiwari, BASF, USA

Speaker: Aaron Anselmo, Vitakey, USA

Half Day Workshop: Advancements in Oral Drug Delivery

8:00 AM - 12:00 PM | Versailles 1 & 2

The purpose of the half-workshop is to showcase the advancements in oral drug delivery. We will provide compelling data and examples surrounding solubility enhancement, the benefits and applications of mucoadhesion, novel approaches to ASD Manufacturing, and the impact of regulatory and supply chain in oral drug products. Our target audience is focused on formulation and R&D scientists in the oral drug delivery space. Our half-day workshop will provide participants with a wealth of knowledge and practical takeaways. We will use commercial product examples and include demonstrations (specifically with mucoadhesion) to create an educational and engaging experience at CRS.

Speaker: Gabe Ellis, Lubrizol Life Science Health

Speaker: Liliana Miinea, Lubrizol Life Science Health

Speaker: Nick Difrancio, Lubrizol Life Science Health

Speaker: Joseph Zeleznik, IMCD

Speaker: Daniel Davis, AustinPx

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Half Day Workshop: Role of formulation scientists in vaccine development, tailoring immunogenicity through rational formulation design.

1:00 PM - 5:00 PM | Versailles 1 & 2

Moderator/Speaker: Roberta Guagliardo, GSK


Speaker: James Dahlman, Georgia Tech

Speaker: Derek O'Hagan, GSK

Speaker: Yvonne Perrie, University of Strathclyde

Speaker: Daniel Siegwart, UT Southwestern Medical Center

Speaker: Rein Verbeke, Ghent University

Sponsored by 

CRS/IPEC Biologics Summit (NEW)

9:00 AM - 4:00 PM | Champagne 1 & 2

This **Biologics Summit**, jointly hosted by the **Controlled Release Society (CRS)** and **IPEC-Americas**, will address the current state and prospects for future advancements related to formulation and characterization technologies, functional excipients, predictive bioavailability, and device technologies to enable the SC delivery of high dose/volume biologics.

Moderator/Speaker: Simon Matoori, PhD, Université de Montréal Montreal

Moderator/Speaker: Beate Bittner, PhD, F. Hoffman-La Roche

Speaker: Nigel Langley, PhD, Gaylord Chemical & IPEC-Americas

Speaker: Patrick Doyle, PhD, MIT

Speaker: Marie Printz, Halozyme
Speaker: Manuel Sanchez-Feliz, PhD,
Speaker: Hao Lou, PhD, University of Kansas
Speaker: Deborah Bitterfield, PhD, Lindy Biosciences
Speaker: Rick Fitch, PhD, Xeris Pharma

Sponsored by



YSC Professional Development Workshop (ticketed event)

12:00 PM – 1:30 PM | Versailles 3 & 4



Innovation Showcase (NEW)

5:00 PM – 7:00 PM | Concorde

The “Innovation Showcase” provides a platform for drug delivery entrepreneurs to share their latest innovations through a series of focused 5-minute “elevator pitch” presentations.

Come to this session to identify new collaboration opportunities as emerging and established businesses highlight innovative concepts ranging from products, services, and new technologies. The “Showcase” presents a session unique to the entire conference as it delivers a concise summary of new offerings from many exhibitors and conference presenters.

Get a head start on networking with potential collaborators during the session coffee breaks or start planning follow-up throughout the rest of the week on the exhibition floor, at a specific symposium lecture, or with another conference attendee directly.

Presented by



YSC Editor Guidance on Paper Writing (ticketed event)

7:00 PM – 8:00 PM | Versailles 3 & 4

YSC Meet & Greet with a Luminary (ticketed event)

8:00 PM – 9:00 PM | Versailles 1 & 2

FG/YSC Networking Event (ticketed event)

*Food and drink ticket provided

9:00 PM – 11:00 PM | Beer Park Garden



TUESDAY, JULY 25, 2023

Tech Forum: Evonik Corporation - Unconventional Technologies to Improve Targeted Release of your Oral Formulation
 8:00 AM – 9:00 AM | Champagne 1 & 2

Speaker: Kamlesh Oza, PhD, Evonik Corporation

Tech Forum: SOTAX - Optimizing In-Vitro Release: A Guide to Developing Robust Methodology

8:00 AM – 9:00 AM | Versailles 1 & 2

Speaker: Vivek Shah, MSc. Chemistry, SOTAX

Tech Forum: Ashland - Long-Acting Injectables (LAI): Improved Bioresorbable Polymers for Formulation Success

8:00 AM – 9:00 AM | Champagne 3 & 4

Speaker: Dr. Bradley Minrovic, Ashland

Tech Forum: Wyatt Technology - Multi-Attribute Quantification (MAQ) of AAVs and LNPs by Light Scattering

8:00 AM – 9:00 AM | Versailles 3 & 4

Speaker: Parker Lee, PhD, Wyatt Technology

Tech Forum: Catalent - Redefining Possibilities with Lipid-based Formulations from Pre-Clinical to Commercial and Harnessing Softgels for Drug Delivery

9:00 AM – 10:00 AM | Champagne 1 & 2

Speakers: Karu Sukura, RPh, PhD, Catalent

Tech Forum: Agilent Technologies, Inc - Exploring Promising Pathways to In Vitro Performance Testing of Dry Powder Inhalers

9:00 AM – 10:00 AM | Champagne 3 & 4

Speaker: Ken Boda, BS, Agilent Technologies, Inc

Tech Forum: Polypus Transfection - Cationic lipids offer new possibilities in liposome and LNP engineering for RNA therapeutics

9:00 AM – 10:00 AM | Versailles 1 & 2

Speaker: Claire Gueguen, Polyplus Transfection

Speaker: Malik Hellal, PhD, Polyplus Transfection

Tech Forum: Vernal Biosciences - LNP Scale-Up for GMP Production

9:00 am to 10:00 am | Versailles 3 & 4

Speaker: Christian Cobaugh, PhD, Vernal Biosciences

IAG/IFC Meeting

9:00 AM – 10:00 AM | Burgundy

Tech Forum: Precision NanoSystem Inc. - How Ionizable Lipids Optimize RNA-LNP Delivery Strategies

10:00 AM – 11:00 AM | Versailles 3 & 4

Speaker: Ian Villamagna. Precision NanoSystems

Tech Forum: NOF CORPORATION - COATSOME® SS Series: Biodegradable Lipid Nanoparticles for Gene Delivery and mRNA Vaccines with Room Temperature Stability

10:00 AM – 11:00 AM | Versailles 1 & 2

Speaker: Syed Reza. NOF CORPORATION

Tech Forum: MilliporeSigma - Early Formulation Screening Service: Bringing nucleic acid modalities to the next level via customized delivery solutions

10:00 AM - 11:00 AM | Champagne 3 & 4

Speaker: Afrisha Anderson, MilliporeSigma

Tech Forum: Colorcon Inc. - Oral drug release modulation through encapsulation and barrier membrane coating to modulate oral drug release.

10:00 AM - 11:00 AM | Champagne 1 & 2

Speaker: Ali Rajabi-Siahboomi, PhD, Colorcon Inc.

Speaker: Jason Hansell, MS, Colorcon Inc.

IC Board Meeting - Hybrid

10:30 AM - 11:30 AM | Chablis

YSC Chat with Industry Foresight Council

11:00 AM - 12:00 PM | Concorde

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Tech Forum: Adare Pharma Solutions - Harmonizing Medication Delivery with the Body's Natural Rhythms: An Important Consideration for Patient-Centric Care

11:00 AM - 12:00 PM | Versailles 1 & 2

Speaker: Srinivasan Shanmugam, PhD, Adare Pharma Solutions

Tech Forum: DSM Biomedical - Relieving Osteoarthritic Pain - Novel Biomaterials for Safer and Longer Acting Solutions

11:00 AM - 12:00 PM | Versailles 3 & 4

Speaker: George Mihov, PhD, DSM Biomedical

Speaker: Gina Conti, DSM Biomedical

Tech Forum: Sanofi - Accelerating the development of mRNA vaccines and therapeutics

11:00 AM - 12:00 PM | Champagne 3 & 4

Speaker: Prof Guarav Sahay, Sanofi

Speaker: Dr. Dan Peer, Sanofi

Speaker: Dr. Roger Pak, Sanofi

Tech Forum: Catalent - Leveraging Oral Solid Dose Technologies for the Development and Manufacturing of Potent Treatments

11:00 AM - 12:00 PM | Champagne 1 & 2

Speaker: Anshul Gupte, PhD, Catalent

YSC Chats with a Luminary (ticketed event)

12:00 PM - 1:00 PM | Versailles 1 & 2

CRS Diversified Products (C&DP) Special Event (ticketed event)

12:00 PM - 1:30 PM | Versailles 3 & 4

DDTR Meeting

12:00 PM - 1:00 PM | Bordeaux

ADDR Editorial Board Meeting

1:00 PM - 2:00 PM | Burgundy

The Science of Outreach

1:00 PM - 2:00 PM | Concorde

Moderator: Assaf Zinger, PhD, Technion- Israel Institute of Technology

Speaker: Elizabeth Nance, PhD, University of Washington

Speaker: Omid Veisheh, PhD, Rice University

Speaker: Michael Mitchell, PhD, University of Pennsylvania

Translational Science & Entrepreneurship Event: mRNA/LNP Therapeutics & Vaccines in Global Healthcare (NEW)

2:00 PM - 3:00 PM | Concorde

Speaker: Guarav Sahay, PhD, Oregon State University

Speaker: Dan Peer, Tel Aviv University

Speaker: Patrick Baumhof, PhD, CureVac AG

Speaker: Roger H. Pak, PhD, Pfizer, Inc.

Speaker: Dr. Jeewon Joung, National Institute of Food and Drug Safety Evaluation/Ministry of Food and Drug Safety

Speaker: Yeon-Hee Kim, PhD, National Institute of Food and Drug Safety Evaluation/Ministry of Food and Drug Safety

Allyship in CRS and Beyond (EDI) Session

3:00 PM - 4:00 PM | Concorde

Moderator: Morgan DiLeo, PhD, University of Pittsburgh

Speaker: Ben Boyd, PhD, University of Copenhagen and Monash University

Speaker: Admire Dube, PhD, University of the Western Cape

Speaker: Mariah Arral, PhD, Carnegie Mellon University

Speaker: Katie Whitehead, PhD, Carnegie Mellon University

BREAK - Coffee & snacks provided

4:00 PM - 4:30 PM | Paris

First Timer Welcome

4:30 PM - 5:00 PM | Concorde

Opening General Session

5:00 PM - 6:00 PM | Concorde

Plenary Session 1: Prof. Daniel G. Anderson, PhD

6:00 PM - 7:00 PM | Concorde

Welcome Reception & Exhibition Hall

*Food & drink ticket provided

7:00 PM - 9:00 PM | Paris

WEDNESDAY, JULY 26, 2023

CRS Diversified Products (C&DP) Board Meeting

8:00 AM - 9:00 AM | Burgundy

Plenary Session 2: Prof. Joseph M. DeSimone, PhD

9:00 AM - 10:00 AM | Concorde

Exhibition Hall & Poster Job Hunt (NEW)

*Coffee & snacks provided

10:00 AM - 11:00 AM | Paris

Tech Session 1: BioEngineering (FG)

11:00 AM - 1:00 PM | Champagne 3 & 4

Moderator: Md Nurunnabi, PhD, University of Texas at El Paso

Moderator: Quanyin Hu, PhD, University of Wisconsin-Madison

Speaker: Alessandro Grattoni, PhD, Houston Methodist Hospital

Speaker: Dr. Jo Varshney, VeriSIM Life

YIA Speaker: Devika Manikam, PhD, Duquesne University

TA Speaker: Morgan Marsh, University of Utah

OA Speaker: J. Andrew MacKay, PhD, University of Southern California / Mann School of Pharmacy and Pharmaceutical Sciences


OA Speaker: Sei Kwang Hahn, PhD, POSTECH

OA Speaker: Gary W. Liu, PhD, Massachusetts Institute of Technology

Tech Session 1: Skin & Mucosal Delivery (FG)

11:00 AM – 1:00 PM | Champagne 1 & 2

Moderator: Simon Matoori, PhD, Université de Montréal
Moderator: Jill Steinbach-Rankins, PhD, University of Louisville
Speaker: Xun Sun, PhD, West China School of Pharmacy Sichuan University
Speaker: Stephen T. Buckley, PhD, Novo Nordisk
MOH Speaker: Justin Hanes, PhD, Johns Hopkins University
BBB Speaker: Dr. Christine Allen, adMare Bioinnovations
OA Speaker: Carmine D'Amico, MSc, University of Helsinki
OA Speaker: Hye Hyeon Han, PhD, POSTECH
OA Speaker: Aaron RJ Hutton, PhD, Queen's University Belfast
OA Speaker: Tannaz Ramezani, PhD, US Food and Drug Administration

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Tech Session 1: New and Emerging Technologies for Drug Delivery

11:00 AM – 1:00 PM | Versailles 1 & 2

Moderator: Dr. Natalie Artzi, Harvard Medical School
Moderator: Leslie Chan, PhD, Georgia Institute of Technology
Speaker: Ronit Satchi-Fainaru, PhD, Tel Aviv University Cancer Biology Research Center
Speaker: Dr. Sujit Basu, Ionis Pharmaceuticals
OA Speaker: Shawn Owen, PhD, University of Utah
OA Speaker: Pauric Bannigan, PhD, Leslie Dan Faculty of Pharmacy
OA Speaker: Ishaan Duggal, MS, University of Texas at Austin
OA Speaker: Nicola Di Trani, PhD, Houston Methodist Research Institute

Tech Session 1: Local Chapters 1

11:00 AM – 1:00 PM | Versailles 3 & 4

Moderator: Bruno Sarmiento, PhD, i3S. Instituto de Investigação e Inovação em Saúde, University of Porto
Moderator: Hannah Zierden, PhD, University of Maryland
Speaker: Jui-Yang Lai, PhD, Chang Gung University
Speaker: Admire Dube, PhD, University of the Western Cape
OA Speaker: Alexandra Stubelius, MPharm, PhD, Chalmers University of Technology
OA Speaker: Manisha Sharma, PhD, The University of Auckland
OA Speaker: Joana Marto, PharmD, PhD, University of Lisbon
OA Speaker: Gayong Shim, PhD, Soongsil University

JCR Editors Meeting

12:00 PM – 1:00 PM | Burgundy

JCR Board Meeting

1:00 PM – 2:00 PM | Burgundy

Exhibition Hall - Poster Judging

*Boxed lunch provided

1:00 PM – 2:00 PM | Paris

Plenary Session 3: Maria Kavallaris, PhD, Australian Centre for NanoMedicine UNSW and Children's Cancer Institute

2:00 PM – 3:00 PM | Concorde

YSC Careers in Industry Round Table (ticketed event)

3:00 PM – 4:00 PM | Versailles 1 & 2

BREAK - Coffee & snacks provided

4:00 PM – 4:30 PM | Paris

Tech Session 2: Immuno Delivery (FG)

4:30 PM – 6:30 PM | Champagne 1 & 2

Moderator: Ryan M. Pearson, PhD, University of Maryland
Moderator: Abhi Acharya, PhD, Arizona State University
Speaker: Siddharth Jhunjhunwala, PhD, Indian Institute of Science
Speaker: Allen Horhota, PhD, Orna Therapeutics
YIA Speaker: Quanyin Hu, PhD, University of Wisconsin-Madison
TA Speaker: Zhaoting Li, PhD, University of Wisconsin-Madison
OA Speaker: Rein Verbeke, PhD, Ghent University
OA Speaker: Sachin Bhagchandani, MS, MIT
OA Speaker: DaWon Kim, University of Wisconsin-Madisons

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Tech Session 2: Oral Delivery (FG)

4:30 PM – 6:30 PM | Champagne 3 & 4

Moderator: Ana Jaklenec, PhD, Massachusetts Institute of Technology
Moderator: Amirali Popat, The University of Queensland
Speaker: Alexandra Teleki, PhD, Uppsala University
Speaker: Dr. Aaron Anselmo, VitaKey Inc.
YIA Speaker: Anette Müllertz, University of Copenhagen
TA Speaker: Rhoda Zhang, PhD student, MIT
OA Speaker: Nazly Pirmoradi, PhD, Palo Alto Research Center
OA Speaker: Stefano Salmaso, PhD, University of Padova
OA Speaker: Ingrid Heyns, PhD, The University of Alabama

Tech Session 2: Delivery Technologies in Cosmetics & Consumer Products (C&DP)

4:30 PM – 6:30 PM | Versailles 3 & 4

Moderator: Jiten Dihora, ChE, Trucapsol LLC
Moderator: Dr. Kenneth Carson, Southwest Research Institute
Speaker: Zhibing Zhang, MSc, PhD, DSC, FREng, University of Birmingham
Speaker: Renata P. Raffin, PhD, Croda
C&DPA Speaker: Marta Alcaina-Hernando, MSc, Nanomol Technologies SL and ICMAB-CSIC
OA Speaker: Francesco Donsi, PhD, University of Salerno
OA Speaker: Joana Marto, PharmD, PhD, University of Lisbon
OA Speaker: Young Min Kim

Tech Session 2: JCR Session

4:30 PM – 6:30 PM | Versailles 1 & 2

Moderator: Yoon Yeo, PhD, Purdue University
Moderator: Mansoor M. Amiji, PhD, FCRS, FAAPS, Northeastern University
Moderator: Tonglei Li, Purdue University
Moderator: Rick Gemeinhart, PhD, University of Illinois Chicago
Speaker: Nicholas A. Peppas, ScD, The University of Texas at Austin
Speaker: Yoon Yeo, PhD, Purdue University
Speaker: Dan Peer, Tel Aviv University
Speaker: Ron Siegel, ScD, University of Minnesota
Speaker: You Han Bae, PhD, University of Utah
Speaker: Kinam Park, PhD, Purdue University

Exhibition Hall & Poster Pub Judging

*Food & drink ticket provided

6:30 PM – 8:30 PM | Paris

Women in Science Awards & Reception (ticketed event)

All are welcome to attend

7:30 PM – 9:30 PM | Champagne 1 & 2

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President's Reception (invitation only)

9:30 PM – 11:00 PM | Alexxa's Private Room

THURSDAY, JULY 27, 2023

Best PhD Thesis in Drug Delivery Science Award Ceremony

8:30 AM – 9:00 AM | Concorde

Moderator: Twan Lammers, PhD, RWTH Aachen University Clinic

Winner: Namit Chaudhary, MIT

Finalist: Max Distler, MIT (video play)

Finalist: Vishnu Sunil

President's Invited Speaker (Plenary Session 4): Prof. Alán

Aspuru-Guzik

9:00 AM – 10:00 AM | Concorde

Exhibition Hall & Poster Judging

*Coffee & snacks provided

10:00 AM – 11:00 AM | Paris

Tech Session 3: Gene Delivery & Gene Editing (FG)

11:00 AM – 1:00 PM | Champagne 1 & 2

Moderator: Michael Mitchell, University of Pennsylvania

Moderator: Omid Veisheh, PhD, Rice University

Speaker: Andrew Wang, MD, University of Texas Southwestern Medical Center

Speaker: Priya Karmali, PhD, Capstan Therapeutics

YIA Speaker: Huiliang Wang, PhD, University of Texas at Austin

TA Speaker: Lisa Volpatti, PhD, University of Pittsburgh

OA Speaker: Miffy Hok Yan Cheng, PhD, UBC

OA Speaker: Michael Munson, PhD, AstraZeneca

OA Speaker: Mahmoud Younis, MS, PhD, Hokkaido University

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Tech Session 3: Ocular Delivery (FG)

11:00 AM – 1:00 PM | Champagne 3 & 4

Moderator: Qingguo Xu, DPhil, Virginia Commonwealth University

Moderator: Crystal Shin, PhD, Baylor College of Medicine

Speaker: Stefaan de Smedt, PhD, Ghent University

Speaker: Steven Castleberry, PhD, Genentech

YIA Speaker: Tuo Meng, PhD, Virginia Commonwealth University

TA Speaker: Deepakkumar Mishra, MPharm, Queen's University

OA Speaker: Xiuling Lu, PhD, University of Connecticut

OA Speaker: Katelyn Swindle-Reilly, MS, PhD, The Ohio State University

OA Speaker: Sei Kwang Hahn, PhD, POSTECH

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SCIENCE TO MEDICINE

Tech Session 3: New Developments in Characterization & Process Scale Up (C&DP)

11:00 AM – 1:00 PM | Versailles 1 & 2

Moderator: James Oxley, PhD, Southwest Research Institute

Moderator: Kurt Ristroph, PhD, Purdue University

Speaker: Robert Prud'homme, PhD, Princeton University

Speaker: Xiaoming Xu, PhD, US Food and Drug Administration

OA Speaker: Ruxandra Gref, PhD, Centre de la Recherche Scientifique

OA Speaker: Mariana Silva, MSc, University of Limerick

OA Speaker: Andrew Clark, PhD, DigiM Solution

OA Speaker: Gert Hendriks, PhD, Innocore Pharmaceuticals

Tech Session 3: Global Health & Special Populations

11:00 AM – 1:00 PM | Versailles 3 & 4

Moderator: Admire Dube, PhD, University of Western Cape

Moderator: Anjali Sharma, PhD, Washington State University

Speaker: S. Rahima Benhabbour, MSc, PhD, University of North Carolina at Chapel Hill

Speaker: Jennifer Walsh, PhD, BPharm, MRPharmS, Jenny Walsh Consulting Ltd.

OA Speaker: Tyler Graf, Rice University

OA Speaker: Suraj Fpanse, University of Connecticut

OA Speaker: Sarah Anne Howard, PhD Candidate, UNC Chapel Hill

OA Speaker: Joseph Della Rocca, PhD, Merck and Co.

Exhibition Hall & Poster Judging

*Boxed Lunch provided

1:00 PM – 2:00 PM | Paris

IAG/IFC Meeting II

2:00 PM – 3:00 PM | Burgundy

YSC Scientific Workshop (ticketed event)

2:00 PM – 3:00 PM | Concorde

Tech Session 4: Nanomedicine & Nanoscale Delivery (FG)

3:00 PM – 5:00 PM | Champagne 1 & 2

Moderator: Helena Florinda, PhD, University of Lisbon

Moderator: Assaf Zinger, PhD, Technion- Israel Institute of Technology

Speaker: Daniel Heller, PhD, Memorial Sloan Kettering Cancer Center

Speaker: Dr. Anthony Cheung, enGene

YIA Speaker: Georgios Sotiriou, PhD, Karolinska Institutet

TA Speaker: Liu Chang, MS, University of Macau

OA Speaker: Victor Passos Gibson

OA Speaker: Lore Herman, PharmD, Ghent University

OA Speaker: Bruno Silva, PhD, Empa - Swiss Federal Laboratories for Materials Science & Technology

Tech Session 4: Nervous System Delivery

3:00 PM – 5:00 PM | Champagne 3 & 4

Moderator: Devika Manickman, PhD, Duquesne University

Moderator: Fan Zhang, PhD, University of Florida

Speaker: Dr. Natalie Artzi, Harvard Medical School

Speaker: Samantha Sarett, PhD, Eli Lilly and Company

OA Speaker: Michelle Palumbo, MS, Oregon Health & Science University

OA Speaker: Oscar Marcos-Contreras, PharmD, PhD, University of Pennsylvania

OA Speaker: Christine Hamadani, M.S., The University of

Mississippi

OA Speaker: Ryan Woodring, University of North Carolina - Chapel Hill

Tech Session 4: Local Chapters 2

3:00 PM – 5:00 PM | Versailles 1 & 2

Moderator: Becky Chen, PhD, National Tsing Hua University

Moderator: John Clegg, PhD, University of Oklahoma

Speaker: Silvia Franzè, PhD, University of Milan

Speaker: Garry Laverty, MPharm., PhD, Queen's University Belfast

Speaker: Dr. Eliana Lima, Federal University of Goias, Brazil

Speaker: Dr. Alessio Malfanti, University of Louvain

Speaker: Tushar Kumeria, PhD, UNSW-Sydney

Speaker: Ying Chau, Hong Kong University of Science and Technology

Tech Session 4: Sustainability & Veterinary Health

3:00 PM – 5:00 PM | Versailles 3 & 4

Moderator: Ana Beloqui, PhD, Université catholique de Louvain

Moderator: Hongbo Pang, PhD, University of Minnesota

Speaker: Juan Pablo Giraldo, PhD, University of California, Riverside

Speaker: Junhua Zhang, PhD, Bayer

OA Speaker: Arlene McDowell, PhD, University of Otago

OA Speaker: Seoa Kim, Aulbio

OA Speaker: Roberta Censi, University of Camerino

OA Speaker: Juan Pablo Giraldo, PhD, University of California, Riverside

Exhibition Hall & Poster Pub Judging

**Food & drink ticket provided*

5:00 PM – 6:00 PM | Paris

Closing General Session

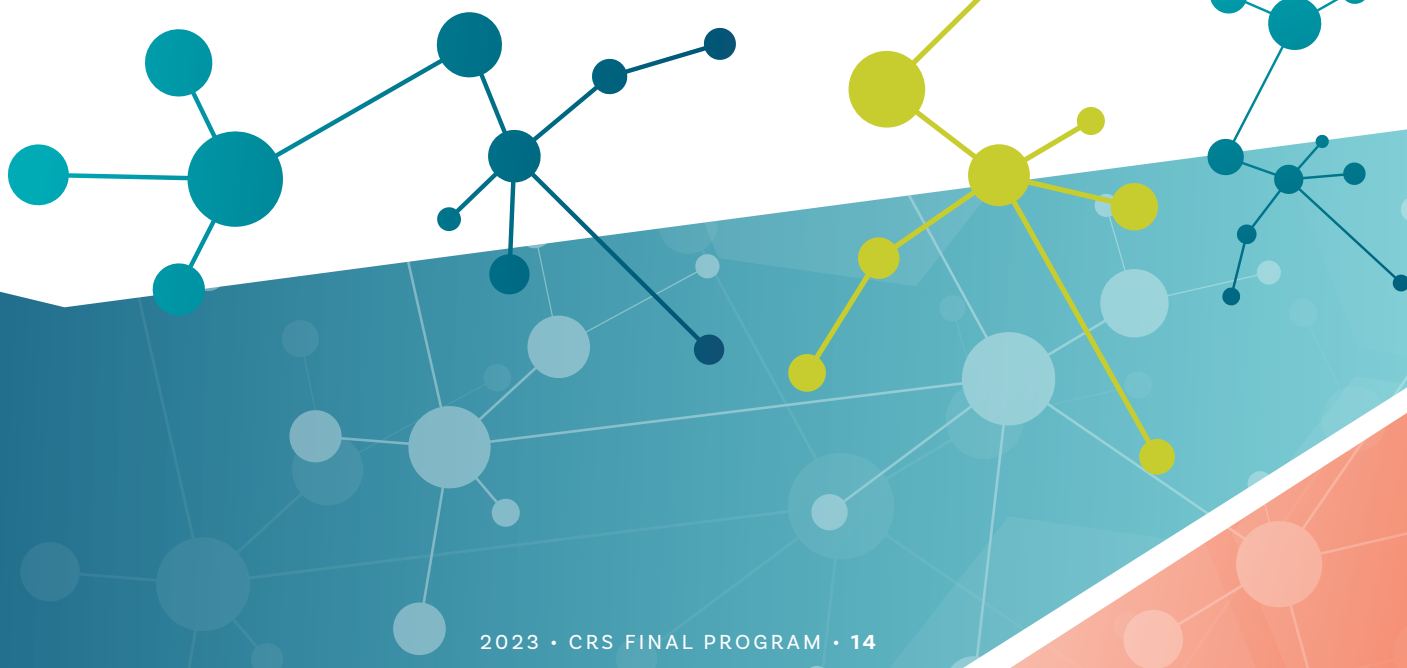
6:00 PM – 8:00 PM | Concorde

Closing Reception

8:00 PM – 11:00 PM | Champagne

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Detailed description of current Exhibitors and the schedule of Exposition Hall hours can be found in the CRS Meeting App.

EXHIBIT HALL HOURS

Tuesday, July 25

Welcome Reception / 7:00 pm to 9:00 pm (food and drink ticket provided)

Wednesday, July 26

AM Break / 10:00 am – 11:00 am (coffee & lite bites provided)

Chat & Chew / 1:00 pm – 2:00 pm (box lunch)

PM Break / 4:00 pm – 4:30 pm (coffee & lite bites provided)

Exhibits & Poster Pub / 7:00 pm – 9:00 pm (food & beverages provided)

Thursday, July 27

AM Break / 10:00 am – 11:00 am (coffee & lite bites provided)

Chat & Chew / 1:00 pm – 2:00 pm (box lunch)

Exhibits & Poster Pub / 5:00 pm – 6:00 pm (coffee & lite bites provided)

EXHIBITOR LIST & BOOTH LOCATIONS

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Agilent Technologies, Inc	312	NanoFCM Co., Ltd.	204
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NanoFCM has developed nano-flow cytometry, a technology that can perform multiple parameter analysis on sub-micron particles, which are typically too small to be detected by conventional and micro flow cytometry. In addition to the assessment of fluorescent probes on small particles, nano-flow cytometry measures particle size, size distribution and concentration with the accuracy & resolution equivalent to electron microscopy.

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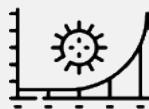
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Youngju Son, *Korea Advanced Institute of Science and Technology*

217: Enhancing tumour -targeted drug delivery by DMOG-induced vascular promotion

Asmaa Elshafei, *Institute of Experimental Molecular Imaging*

218: Development of immunogenic nanocomposites based on chemiluminescence resonance energy transfer for cancer immunotherapy

Minsung Park, *Sungkyunkwan University*

219: Multimodal Theranostics for Management of Prostate Cancer

Wojciech Lesniak, *Johns Hopkins School of Medicine*

220: Intracellular delivery of p53 protein using genetically-encoded protein crystals for overcoming the tumor resistance to chemotherapy and immunotherapy

Michael Chan, *The Chinese University of Hong Kong*

221: Development of imatinib-loaded polymeric nanoparticles for the treatment of pulmonary hypertension.

Scheilly Tsilova, *University College London*

222: Drug delivery system for surgical infection management

Stefano Serpelloni, *Houston Methodist Academic Institute*

223: Sustained Release of Small-Molecule Therapeutics from Methacrylated Poly(Glycerol-Sebacate) Microparticles

Mei-Li Laracuente, *Rice University*

224: Protein-stabilized nanomaterials: the next generation of theranostic agents

Gabriela Faria, *Center for Cooperative Research in Biomaterials*

225: Hepatic fibrosis-specific activated treatment through anti-fibrotic peptide delivery

Jaiwoo Lee, *Seoul National University*

226: Micro-Combinatorial Hydrogel Particles for TNBC lung metastasis suppression

Anna Lisa Palange, *Italian Institute of Technology*

227: Bi₂S₃@C/Pd-BSA hetero-nanostructures for photocatalysis-mediated hydrogen sulfide splitting and hydrogen production for colorectal cancer therapy.

Arjun Sabu, *National Tsing Hua University*

228: The protein corona of nanoparticles: impact of protein interactions on the interfacial and thermoresponsive behaviour of polymeric nanogels.

Federico Traldi, *Queen Mary University of London*

229: Targeted Nanocarriers Prevent Drug Partitioning to Red Blood Cell and Improve Therapeutic Efficacy in Acute Brain Inflammation

Jia Nong, *University of Pennsylvania*

230: The effect of fibrotic encapsulation on drug delivery from implantable devices

Simone Capuani, *Houston Methodist Research Institute*

231: Vapor nanobubble-mediated photoporation for pre-formation loading of extracellular vesicles with exogenous molecules

Jana Ramon, *Ghent University*

233: Shaped defined-PLGA microparticles: therapeutic efficacy and tribological behavior in Osteoarthritis

Agnese Fragassi, *Università Degli Studi di Genova and Istituto Italiano di Tecnologia*

234: Microfluidic Chip for the evaluation of therapeutics and carrier drugs in breast cancer tissue

Julio Rincon, *The University of North Texas Health Science Center*

235: Targeting Chronic Kidney Disease with Size- and Charge-optimized Polymeric Drug Carriers

Vedangi Kulkarni, *Institute of Experimental Molecular Imaging*

236: Targeting senescence with a nanoparticle-encapsulated PROTAC inhibits the growth of pancreatic ductal adenocarcinoma

Ashley Sullivan, *Memorial Sloan Kettering Cancer Center*

237: Remotely controlled nanofluidic implant with electrostatic control of drug delivery

Nicola Di Trani, *Houston Methodist Research Institute*

238: Overcoming biological barriers in targeting pulmonary intracellular infections using lipid-based nanoparticles

Santhni Subramaniam, *University of South Australia*

239: Prohibitin-targeting nanomedicine for obesity-induced metabolic syndromes via hemoxygease-1 overexpression in liver and adipose tissue simultaneously.

Minjeong Kim, *Hanyang University*

240: Nanofabrication of PLLA-based Electrospun Doxorubicin Loaded Implant as a Sustained-Release Dosage form for Breast Cancer Immunotherapy and Lost Tissues Restoration

Isra Ali, *University of Sadat City*

241: Controlled temporal gradient of retinoic acid using porous silicon microparticles for neuronal differentiation of hiPSCs

Juyoung Seong, *UNIST*

242: Ethinyl-estradiol anchored stealth liposomes as a nanomodule for the combination therapy of breast cancer

Sunny Rathee, *A Central University of Madhya Pradesh*

243: Controlled temporal gradient of retinoic acid using porous silicon microparticles for neuronal differentiation of hiPSCs

Juyoung Seong, *UNIST*

244: Breaking through the Blood-Brain Barrier: The synergy of machine learning and molecular simulations in designing Cell-Penetrating Peptides for Glioblastoma nanoparticle therapy

Tânia Cova, *University of Coimbra*

245: Long-lived phosphorescent silica nanoparticles for high-contrast in vivo tracking and precision cancer diagnostics

Kyunghwan Kim, *Sookmyung Women's University*

246: Impact of protein corona on the molecular specificity and cellular uptake of decreased nonspecific adhesivity, receptor-targeted (DART) nanoparticles for clinical translation

Nikhil Pandey, *University of Maryland Baltimore*

247: Loratadine Loaded Chitosan Tannic Acid Nanoparticles as Anti-Cancer Agent for Breast Cancer Treatment: In-Silico, In-vitro and Cell Studies

Isra Ali, *University of Sadat City*

248: Co-delivery of fulvestrant and siRNA in nanoparticles for drug-resistant breast cancer

Kai Slaughter, *University of Toronto*

249: Daclatasvir Loaded Chitosan Gelatin Nanoparticles in Nanofibers as Smart Medical Textiles for Prevention and Treatment of SARS CoV-2: in Silico, in Vitro and in Vivo

Isra Ali, *University of Sadat City*

250: Combinatorial Efficacy of Loratadine and 5-Floraucil Loaded Zein Tannic Acid nanoparticles in Treatment of Breast Cancer

Mohamed Hamdi, *University of Sadat City*

252: Customized Extruded Zinc Oxide Loaded PLLA filament for 3D printing of Implantable Anti-tumor Printlets

Mohamed Hamdi, *University of Sadat City*

253: Customized Extruded Silver Nanoparticles Loaded PLLA filament for 3D printing of Implantable Antimicrobial and Anti-tumor Printlets

Afaf Madkour, *University of Sadat City*

254: Verapamil Loaded Chitosan Glutamic Acid Nanoparticles in PLLA based Nanofibers as Single Dose Wound Healing Patch

Afaf Madkour, *University of Sadat City*

255: HER2 levels alone are not indicative of response to HER2-Targeting Therapy

Shawn Owen, *University of Utah*

256: Effects of monomer on PLGA based long-acting injectables' release and stability

Cory Mahnen, *Ashland*

257: Controlled release of proteins from a topical ocular drug delivery gelling system for the treatment of neovascular retinal diseases

Phillip Harding, *University of Pittsburgh*

258: Fabrication of crosslinked polyglycerol-co-sebacate acrylate nanoparticles for tailored release of small molecules to the posterior segment of the eye

Katie Glover, *Queen's University*

259: Apical sodium bile acid transporter-mediated endocytosis of GLP-1A nanoparticles through coordination with EGFR in GI tract

Seho Kweon, *Seoul National University*

260: Neonatal Fc receptor-targeted nanomedicines for the intestinal delivery of semaglutide

Soraia Pinto, *Instituto de Investigação e Inovação em Saúde (i3S)*

261: Impact of composition and cultivation conditions of intestinal models on oral nanocarrier permeation

Jonas Schreiner, *Goethe University*

262: Mucoadhesive oral vehicle mediated codelivery of 5FU and Bcl2 siRNA attenuates stomach cancer

Md Nurunnabi, *UT El Paso*

263: Engineered microencapsulated protein nanoconjugates for oral targeted colon cancer therapy

Marwa Sallam, *Alexandria University*

265: Norcantharidin nanoemulsion development, characterization and in vitro antiproliferation effect on B16F1 melanoma cells
Francisco Veiga, *University of Coimbra*

266: Amino Acid -Based Nanocapsules for Taste Masking of Bitter Drug: Fabrication and Palatability Evaluation
Saleh Alyami, *Najran University*

267: Lipopolysaccharide (LPS)-Based Biomimetic Nanoparticles for Efficient Cytosolic siRNA Delivery via Enhanced Early Endosomal Membrane Fusion
Di Nie, *Shanghai Institute of Materia Medica, Chinese Academy of Sciences*

268: Estradiol nanoparticle formulation for improved vaginal treatment of post-menopausal vaginal atrophy
Rachel Shapiro, *Johns Hopkins University*

269: Towards stimuli-responsive polymer-based hydrogels integrated in smart drug delivery devices
Manoj Sharma, *Lancaster University*

270: Injectable Antibacterial Dressings for the Treatment of Chronic Rhinosinusitis (CRS)
Bhuvanesh Yathavan, *University of Utah*

271: Study of the lymphatic delivery and biodistribution of the antiretroviral drugs cabotegravir and rilpivirine following delivery by dissolving polymeric microarray patches
Fabiana Volpe-Zanutto, *Queens University Belfast*

272: Biomanufacturing bacterial extracellular vesicles as a novel drug delivery platform
Robert Kirian, *University of Maryland*

273: Development of Dissolving Microneedles for Immunomodulation through M1-type Macrophages Polarization
Maria Lobita, *University Medical Center Groningen*

274: In vitro-in vivo comparison of cooling sensation in topical gel products
Yousuf Mohammed, *The University of Queensland Faculty of Medicine*

275: Nanofabrication of PLLA-based Electrospun Piroxicam Loaded Patches as a Sustained-Release Dosage form for Skin Cancer Treatment and Tissue Restoration
Afaf Madkour, *University of Sadat City*

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Kalindu Fernando, *Hong Kong University of Science & Technology*

277: Development of acrylate-based pH-responsive hydrogels for a colon-targeted drug delivery system.
Mohammad Rabeh, *Queen's University Belfast*

278: Study Transportation of Oral Drugs within Newly Established Colon Organoid Systems
Qun Wang, *Iowa State University*

279: Manufacturing of personalized tablets via two additive manufacturing techniques of Fused filament fabrication and Droplet deposition modeling
Farnoosh Ebrahimi, *PRISM Research Institute*

280: A head-to-head comparison of Caco2 Transwells vs. Gut-on-a-Chip to assess permeation enhancer efficacy for oral formulations
John Gleeson, *Merck & Co.*

281: A bioresponsive genetically-encoded antimicrobial crystal for the oral treatment of H. pylori infection
Marianne Lee, *The Chinese University of Hong Kong*

283: Designing biocompatible peptide-based hydrogels for in-vivo drug and cell delivery applications
Alberto Saiani, *University of Manchester*

284: Injectable hydrogel for subcutaneous delivery of peptide-functionalized therapeutics to treat rheumatoid arthritis
Yiqin Li, *University of Minnesota*

285: Antibacterial and anti-encrustation weak organic acids-loaded PLA coating on urinary catheters
Tiancheng Luo, *Queen's University of Belfast*

286: 3D-Printed Scaffolds for Localized, Dual Delivery of Antibiotic and Probiotic Release for Vaginal Applications
Anthony Kyser, *University of Louisville*

287: Personalized Hydrogel Wound Dressing via 3D Printing for Chronic Wound Treatment
Tianyang Zhao, *National University of Singapore*

288: Cyclodextrin-carvedilol complex tipped microarray patches for the management of heart failure
Qonita Kurnia Anjani, *Queen's University Belfast*

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Bassam Fotouh, *University of Louisville*

290: Role of microneedle topography on coating efficiency
Yousuf Mohammed, *The University of Queensland*

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Tao Zheng, *University of Michigan*

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Zhongfang Zhang, *University of Pittsburgh*

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Yu-Chen Hu, *National Tsing Hua University*

294: Sugar alcohol-modified polyester nanoparticles for nucleic acid delivery to the brain
Betsy Reshma, *Institute of Genomics and Integrative Biology*

295: Early Formulation Screening Service: Bringing nucleic acid modalities to the next level via customized delivery solutions
Eleni Samaridou, *Merck Life Science KGaA*

296: The impact of the payload and phospholipid on critical quality attributes of lipid nanoparticles.
Agata Ugorenko, *University of Strathclyde*

297: Development of bio-adhesive janus-faced microfilms for controlled gene delivery
Yong-Wook Son, *Yonsei university*

298: Well Characterized Lipid Nanoparticle Library Accelerates Development of Next Generation Genomic Medicines
Sedigheh (Cece) Nazaripour, *Precision NanoSystems*

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Hyun-Woo Park, *Yonsei University*

300: Development of lipid-based nanoparticles for the management of lysosomal acid lipase deficiency by gene replacement therapy
Matthias Zadory, *University of Montreal*

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Hana Cho, *The Catholic University of Korea*

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Cristina Casadidio, *University of Camerino*

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Cristina Casadidio, *University of Camerino*

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Hulya Bayraktutan, *University of Nottingham*

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Yuang Chen, *University of Pittsburgh*

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Jilian Melamed, *Carnegie Mellon University*

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Heyang Zhang, *Leiden University*

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Ekta Kapoor, *University of Nebraska Medical Center*

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Allen Jiang, *Massachusetts Institute of Technology*

310: Nature-Inspired Nanoparticles for Gene and Vaccine Delivery
Hao Song, *The University of Queensland*

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Bei Zhan, *University of Pittsburgh*

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Ying Chau, *The Hong Kong University of Science and Technology Shenzhen Research Institute*

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Yi Yan Yang, *Institute of Bioengineering and Bioimaging, Agency for Science, Technology and Research*

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Ankita Borah, *University of Strathclyde*

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Simone Carneiro, *Ludwig Maximilians Universität München*

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Lulu Xue, *University of Pennsylvania*

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David Lee, *Rutgers University*

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Dongdong Bi, *Leiden University*

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Chiara Mancino, *Houston Methodist Academic Institute*

- 321:** Long-term storage of mRNA-loaded lipid nanoparticles (mRNA-LNPs) by lyophilization
Boon Lin Chua, *Agency for Science, Technology and Research*
- 322:** Design Spaces for Lipid Nanoparticles and mRNA Formulation
Kirstin Meiners, *University of Wuerzburg*
- 323:** Development of ionic liquid coated-lipid nanoparticles for brain drug delivery
Purva Khare, *Duquesne University*
- 324:** Ionizable Lipid-Modified Solid Lipid Nanoparticles for Efficient DNA Delivery
Nipuni Maniyamgama, *A*STAR / National University of Singapore*
- 325:** Developing Gene Therapies and Vaccines for Pulmonary Delivery
Savvas Dimiou, *UCL*
- 326:** All-in-one delivery system for miRNA, chemotherapy, and PDT combinational therapy by surface engineering of MOFs
Xin Li, *Technical University of Denmark*
- 327:** Novel dual-delivery system of doxorubicin and mango seed kernel extract from *Mangifera indica* L. as adjuvant therapy against hepatocellular carcinoma
Pakatip Ruenraroengsak, *Mahidol University*
- 328:** Optimizing high ionic strength formulated LNP mRNA systems for potent liver transfection
Jerry Leung, *University of British Columbia*
- 329:** An acid degradable linker that rapidly hydrolyzes at pH 6.0 enhances the delivery of mRNA/lipid nanoparticle complexes in vivo
Niren Murthy, *University of California at Berkeley*
- 330:** A Single Dose F1-Based mRNA-LNP Vaccine Provides Protection Against the Lethal Plague Bacterium
Uri Elia, *Tel Aviv University*
- 332:** Towards effective cardiac modified messenger RNA delivery using lipid nanoparticles: cellular targets and immune response
Maria Clara Labonia, *University Medical Centre of Utrecht*
- 333:** Reduced PEG Content in Non-Cationic Lipid Nanoparticles for Enhanced Cellular Uptake
Phillip West, *University of Tennessee Graduate School of Medicine*
- 334:** Novel microfluidic dual vortex mixer for scalable production of drug delivery nanoparticles
Gi-Su Na, *POSTECH*
- 335:** Block-copolymer stabilized lipid nanoparticles: A novel platform for targeted gene delivery
Sai Nikhil Subraveti, *Princeton University*
- 336:** Reaching undruggable oncoproteins via siRNA delivery: the KRAS case
Philipp Lapuhs, *University of Santiago de Compostela*
- 337:** Sphingomyelin-based nanoparticles for in vivo mRNA delivery
Laura Taina-Gonzalez, *DIVERSA Technologies*
- 338:** Light-Activated siRNA Endosomal Release (LASER) by Porphyrin Lipid Nanoparticles
Yulin Mo, *University of Toronto*
- 339:** pH-Responsively Degradable Polypeptides-like Biodynamer for Nucleotide Delivery
Sangeun Lee, *Saarland University*
- 340:** Enabling mRNA Therapies for Central Nervous System Disorders
Saigopalakrishna Yerneni, *Carnegie Mellon University*
- 341:** Improvement in vivo gene editing efficiency with ribonucleoproteins using sponge-like silica nanoconstruct
Hyojin Lee, *Korea Institute of Science and Technology*
- 342:** Aerosolized mRNA Lipid Nanoparticles for Pulmonary Delivery
Mae Lewis, *University of Texas at Austin*
- 343:** Microfluidic-assisted dialysis for continuous-flow purification of lipid nanoparticles
Jeong-Un Joo, *POSTECH*
- 344:** Glial Cell Targeted Polymer Nanoparticles for Delivery of Base Editors to Treat SOD-1 Linked ALS
Anthony Duong, *Battelle Memorial Institute*
- 345:** In vitro investigation of polymeric nanoparticle loaded with PD-L1 siRNA in breast cancer
Farid Dorkoosh, *Tehran university of medical sciences*
- 347:** Combination nanoparticles of the hedgehog inhibitor MDB5 and the PI3K/BRD4 inhibitor SF2523 protect mice from alcoholic liver injury
Virender Kumar, *University of Nebraska Medical Center*
- 348:** Stabilization of mRNA Vaccines by Utilizing Drying Technologies.
Roland Böttger, *CureVac SE*
- 349:** siRNA-Nanoparticles to Modulate Cell Migration in SARS-CoV-2 Infection
Heloisa Ferreira, *Federal University of Minas Gerais*
- 350:** Studies of liquid-crystalline nanoparticles interactions with Langmuir monolayers and 2D cell culture
Maria Vitória Bentley, *University of Sao Paulo*

352: Interaction between simulated mucus and liquid-crystalline phase nanodispersions for intranasal delivery system: a Small-Angle X-ray Scattering study
Bryan Debiasi, *University of São Paulo*

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David Jürgens, *LMU Munich*

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Shota Kojima, *Osaka Otani University*

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Saed Abbasi, *Johns Hopkins University*

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Dylan Hendy, *University of North Carolina- Chapel Hill*

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Vicki Houle, *Xeris Pharmaceuticals*

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Ying Chau, *The Hong Kong University of Science and Technology*

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Ariel Zhang, *Precision NanoSystems*

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Minji Ahn, *The Catholic University of Korea*

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Erik Pena, *University of North Carolina at Chapel Hill*

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Valentina Di Francesco, *Northeastern University*

364: Novel, High-Concentration Viscoelastic Suspensions of Trastuzumab Are Stable and Injectable With Small Needles
Vicki Houle, *Xeris Pharmaceuticals, Inc.*

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Harsh Patel, *Celanese Industries*

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Yusuf Haggag, *University of Michigan*

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Cristina Casadidio, *University of Camerino*

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Quanyin Hu, *University of Wisconsin-Madison*

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James Moon, *University of Michigan, Ann Arbor*

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James Moon, *University of Michigan, Ann Arbor*

371: Development of Next Generation Antibody-Polymer-Drug Conjugates
Jane Yang, *University of Utah*

373: Complementary Macrophage Immunomodulation by Acoustically Responsive Nanoparticles
Taylor Ausec, *University of Colorado Boulder*

374: Locoregional Nitric Oxide Delivery in Cancer Immunotherapy
Jihoon Kim, *Yonsei University*

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Oliwia Majchrzak, *University of Geneva*

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Jan-Georg Rosenboom, *MIT*

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Karen Chan, *University of British Columbia*

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Michael Gambles, *University of Utah*

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Yoshiki Katayama, *Kyushu University*

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Ziqian Zhang, *University of Pittsburgh*

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Ragna Haegebaert, *Ghent University*

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Hyunjin Kim, *National Cancer Center*

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Nicole Day, *University of Colorado*

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Satya Siva Kishan Yalamarty, *Northeastern University*

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Yina Wu, *Seoul National University*

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Flávia Sousa, *Adolphe Merkle Institute*

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Octavius Jessica Yap, *Hong Kong University of Science and Technology*

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Špela Zupančič, *University of Ljubljana*

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Corrine Din, *University of Michigan*

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Zhaofei Guo, *Sichuan University*

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Chunting He, *Sichuan University*

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Yuan Xue, *Sichuan University*

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Yue Li, *University of Colorado*

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Hend Mohamed Abdel-Bar, *University of Sadat City*

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Quim Peña, *RWTH Aachen University*

399: Stability of a IgG1 monoclonal antibody during deposition of controlled release coating using atomic layer deposition
Joel Hellrup, *Nanexa AB*

400: A systematic approach to optimize liposomal azithromycin to treat cardiac inflammation.
Abdullah Masud, *University of Kentucky*

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Ellen Wasan, *University of Saskatchewan*

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Byoungjae Kong, *Johns Hopkins University*

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Khaled Greish, *Arabian Gulf University*

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Kabirat Babalola, *The University of Alabama*

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Jin Woo Park, *Mokpo National University*

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Penghui He, *Sichuan University*

407: Targeting intestinal immune cells for enhanced immunodelivery
Olivia Müllertz, *BioMed X institute*

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George Bebawy, *University College London*

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Annika Yardy, *McMaster University*

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Yasmine Gomaa, *Georgia Institute of Technology*

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Mohamed Yousif, *UCL School of Pharmacy*

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Mohamed Yousif, *UCL School of Pharmacy*

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Sobia Noreen, *Islamia University Bahawalpur*

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Shubham Khot, *Sinhgad Institute of Pharmacy*

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Vandana Soni, *Dr. Harisingh Gour University, Sagar, India*

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Rae Hyung Kang, *University of Wisconsin-Madison*

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Valeria Giacobbo, *University of Strathclyde*

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Diane Nelson, *National Institute of Standards and Technology*

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Sampa Sarkar, *RMIT University*

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Jessica Hersh, *University of Miami*

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Naveed Ahmad, *King's College London UK*

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Sarita Maurya, *University of Allahabad*

423: Development of a Microfluidic Process for Liposome Manufacturing Remotely Loaded with Doxorubicin
Saddam Al Ani, *Strathclyde Institute of Pharmacy and Biomedical Sciences*

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Jianhui Liu, *Harvard School of Dental Medicine*

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Burcu Eryilmaz, *University of Strathclyde*

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Jun Fang, *Sojo University*

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Caitlin McMillan, *University of Strathclyde*

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Naxhije Berisha, *The Graduate Center of the City University of New York*

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Mahima Dewani, *Indian Institute of Technology*

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Hamad Alyami, *Najran University*

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Xin Gu, *Rutgers University*

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Lea Guerassimoff, *Insitut Galien Paris-Saclay*

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Muattaz Hussain, *University of Strathclyde*

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Domenico D'Atri, *NIH*

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Amandine Gendron, *Paris Saclay University*

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Elliya Park, *University of Toronto*

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Xingping Quan, *University of Macau*

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442: Insight onto the development and use of a new polymer for lipid-based nanotechnology drug delivery platforms Author:

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443: Injectable and temperature-sensitive hydroxyapatite gel scaffolds containing phosphorylated vitamin D3 liposome for controlled release of rapamycin into the tooth pocket

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445: Near-infrared light-driven metabolic reprogramming in mitochondria-targeted albumin nanoparticles for triple-negative breast cancer treatment

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447: Preparation and Characterization of Macrophage-like Photo Responsive Silica-coated Upconversion Nanoparticles for Breast Cancer Immunotherapy

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448: Upconversion nanoparticles containing erythrocyte-mimicking microgels for treating hypoxic tumors.

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450: Infiltrating gold nanoparticles as sonosensitizers in cancer treatment

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464: Membrane Functionalization of Milk-derived Exosomes via a Post-Insertion Method for Tumor-targeted Drug Delivery

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506: Engineered liposomes to deliver nucleic acid mimics in Escherichia coli

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511: Supramolecularly-Crosslinked Nanoassemblies for Ultrasound-Triggered Chemotherapeutic Drug Release

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513: Controlled Release of NSAIDs via Coordination Polymers

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648: Efficacy of liposomal-based formulations of olaparib and topotecan in primary epithelial ovarian cancer cells.
Aleksandra Romaniuk-Drapala, *Poznan University of Medical Sciences*

649: Preparation of the nanoemulsion with deep eutectic solvent of Pirfenidone and citric acid for liquid inhalation
Young-Jin Kim, *Chungbuk National University*

650: Slow Release of Nitric Oxide (NO) From a Novel Lipophilic NO Donor
Gergely Lautner, *University of Michigan*

651: Impact of post-processing temperature on PLGA microparticle performance
Andrew Otte, *Purdue University*

652: Development of in-situ fiber optic method for evaluation of burst release kinetics of poly(lactic-co-glycolic acid) microspheres
Minzhi Yu, *University of Michigan*

653: Formulation and Characterization of Exenatide-PLGA Microspheres prepared by Coacervation
Cameron White, *University of Michigan*

654: Impact of physical ageing on the density and microstructure of polymeric parenteral microspheres
Andrew Clark, *DigiM Solution LLC*

655: Laser-induced nanobubbles for mRNA delivery to the ocular surface
Félix Sauvage, *Ghent University*

656: Development of polyarginine-functionalized nanotherapeutics for alleviation of macular degeneration
Jui-Yang Lai, *Chang Gung University*

657: Machine-learning driven multifunctional peptide engineering for sustained ocular drug delivery
Jahnvi Pejavar, *Johns Hopkins University*

658: Develop a controlled release system of cysteamine for corneal cystinosis with improved drug stability
Xin Fan, *University of Pittsburgh*

659: Formulation of gefarnate-containing in situ gel to treat dry eye
Chun-Hsu Yao, *China Medical University*

660: Naringenin Loaded Molecularly Imprinted Contact Lens; Sustained Release Drug Delivery to Treat Posterior Eye Segment Diseases
Syed Ali Faran, *South East Technological University*

661: Thermo-responsive in-situ gel containing hyaluronic acid and indomethacin for the treatment of corneal chemical burn
Armando da Silva Cunha Junior, *Universidade Federal de Minas Geras - UFMG*

662: Development of Silica Release Model for Intraocular Injections
James Mullin, *Simulations Plus*

663: Pharmacokinetic Evaluation of Novel Drug Candidates for the Treatment of Retinitis Pigmentosa
Meredith Garrett, *University of North Texas Health Science Center*

664: Development of co-loaded liposomes for posterior segment ocular delivery
Umer Farooq, *South East Technological University*

665: Controlled release of resveratrol to eye structures using contact lenses
Maria Vivero-Lopez, *University of Santiago de Compostela*

666: Hybrid tri-block Copolymer nanomicelles loaded with Curcumin for the Management of Dry Eye Disease
Ahmad Assiri, *Queen's University Belfast*

667: Development of a finite element model to aid ocular microneedle optimisation
Katie Glover, *Queen's University Belfast*

668: In situ forming hydrogels for ocular delivery of Golimumab and Aflibercept
Blessing Ilochonwu, *Utrecht University*

669: Stability Evaluation of Monoclonal Antibodies and Antibody Fragments under Physiological Conditions of the Vitreous Following Sustained Intravitreal Delivery
Lena Spindler, *Boehringer Ingelheim Pharma GmbH & Co. KG*

670: Incorporation of poly(methacrylated vitamin E) into pHEMA for contact lens materials based ocular drug delivery
Lina Liu, *McMaster University*

671: Cyclosporin A-laden nanoparticles inhibits lymphangiogenesis and offers cardiovascular protection in lupus prone mouse model.
Raghu Ganugula, *University of Alabama*

672: Synthesis and characterization of novel lipoplex loaded PLGA Microparticles (MPs) for posterior segment eye (PE) delivery.
Ayah Burhan, *South East Technological University-Ireland*

676: Development of PLGA-Based Implants Using Hot Melt Extrusion for Sustained Release of Drugs: The Impacts of PLGA's Material Characteristics
Fengyuan Yang, *Ashland*

677: Controlled Release from Sintered Electrospun Capsules with Nanoscale Porosity
Francisco Chaparro, *The Ohio State University*

678: Erosion of Biodegradable Polymers in Drug Delivery Micro-Implants by q-NMR
HongPeng Wang, *AbbVie*

679: Thermoresponsive engineered emulsions stabilised by di(ethylene glycol) methyl ether methacrylate branched copolymer surfactants
Abhishek Rajbanshi, *University of Hertfordshire*

680: Preparation and testing of rate controlling membranes on cylindrical drug reservoirs via dip coating
Joel Updyke, *University of Minnesota*

681: Formulation of cellulose and its derivative-based fill for encapsulation in softgels and controlled release drug applications
Soo Ah Jin, *Catalent Pharma Solutions*

682: An edible monolithic gel matrix encapsulating isoniazid for tuberculosis prophylaxis.
Emma Kean, *Dalhousie University*

683: Predictive Model to Determine the Aqueous Solubility of BCS Class 4 Drugs in Amorphous Solid Dispersions
Sridivya Raparla, *University of the Pacific*

684: Predictive Dissolution and Precipitation Tools to Guide Weak Base Drug Formulation Development
Zhao Liu, *Merck & Co. Inc.*

685: Controlled drug release from push-pull osmotic pump tablets: a digital tool
Charley Wu, *University of Surrey*

686: Continuous processing of alcohol-resistant sustained release mini matrices of highly water soluble drug via hot melt extrusion technology
Divya Jain, *Institute of Chemical Technology*

687: Self-Nano Emulsifying Formulation for Enhancing the Bioavailability of Novel Peripherally Restricted Cannabinoid-1 Receptor (CB1R) Blockers
Asaad Gammal, *Hebrew University of Jerusalem*

688: Development of O₂ scavenging Microcomposite Formulations for Colonic Delivery of Anaerobic Bacteria
Phuong Linh Ta, *University of Birmingham*

689: Modular titratable polypills for personalized medicine and simplification of complex medication regimens
Christina Karavasili, *Massachusetts Institute of Technology*

690: Optimization of the process of obtaining solid ibuprofen dispersions by hot melt impregnation technique
Wieslaw Sawicki, *Medical University of Gdansk*

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Jiaying Liu, *Merck & Co., Inc.*

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Hangyeol Jang, *Dankook University*

693: Development of ezetimibe-loaded fibrous microparticles for improved solubility and oral bioavailability using electrospray technique
Dongwon Lee, *Dankook University*

694: Development of a Multi-Pill Abuse Resistant Extended-Release Formulation to Prevent Opioid Overdose
Katie Pepper, *Quotient Sciences*

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Richard Horniblow, *University of Birmingham*

696: A comprehensive characterisation of biopolymer microparticle oral formulations undergoing gastrointestinal simulation
Sarah Corrigan, *University of Birmingham*

697: Evaluation of the compatibility of Enprotect™ capsules with solid-phase excipients to accelerate formulation development of enteric dosage forms
Vincent Jannin, *Lonza Capsugel France SAS*

698: Flexible Coatings Achieve pH-targeted Drug release via self-unfolding foils: applications for oral drug delivery
Laura De Vittorio, *Technical University of Denmark (DTU)*

699: Coupling PhysioCell® with Design of Experiments as a novel method for physiologically-relevant dissolution testing of soft capsules
Marcela Staniszevska, *Physiolution Polska*

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Meng Zhang, *Queen's University Belfast*

701: Improvement of oral bioavailability of Dasatinib by using novel oleogel particle-based emulsion
Areen Ashkar, *Ashkar*

702: Informing pre-formulation decisions using drug-polymer miscibility data from high-throughput stability screens of microarray libraries
Noha Ghazi, *University of Nottingham*

703: Effect of food on the release and bioaccessibility of an oral BCS Class II compound during transit through tiny-TIMsg.
Vanessa Mancini, *The TIM Company*

704: Calculating Residence Time and its Effects on Twin Screw Extrusion Processes
Brian Haight, *Leistritz Extrusion*

705: Rifampicin granular sprinkles for easy oral administration: Formulation and physicochemical evaluation
Oluwatoyin Adeleke, *Dalhousie University*

706: Trends in small molecule drug properties: A developability molecule assessment perspective
Prashant Agarwal, *Northeastern University*

707: Pharmaceutical Approaches for Enhancing Solubility of Simvastatin: Utilizing Hot melt extrusion and Self-Emulsifying Drug Delivery System
HyeSung Oh, *Sahmyook University*

708: The balance of physical stability and drug release in ternary fenofibrate/HPC/Eudragit L100 amorphous solid dispersions
Christian Luebbert, *amofor GmbH*

709: Hydrodynamic robustness of Klucel™ xtend hydroxypropylcellulose (HPC) for modified release matrix systems
Quyên Schwing, *Ashland Specialty Ingredients*

710: Does Mucus Impact Formulation Performance? – An exploration of supersaturation and precipitation effect
Victus Kordorwu, *Genentech Inc.*

711: Structure/Activity Relationship Analysis of Rationally Designed Peptides to Improve Epithelial Permeation Enhancement
Alistair Taverner, *A. Taverner, Life Sciences, University of Bath, Bath, United Kingdom*

712: Tuning the double lipidation of salmon calcitonin to introduce a pore-like membrane translocation mechanism
Philip Lund, *Technical University of Denmark*

713: An artificial intelligence decision system for solubilization strategies of small molecule drug candidates: lessons from approved drugs
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714: Ionic Cross-linking Controlled Mucoadhesive Chitosan Microcapsules for Bioavailability Enhancement and Controlled Gastrointestinal Delivery of Oligopeptides
Kyungjik Yang, *Yonsei University*

715: Formulation Development of Modified Release MUPS tablet to reduce upper GI side effects of an antibiotic
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716: Personalized drug delivery using new 3D printed design Flexible-pill
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717: Preparation of alginate beads for sustained-release self-microemulsifying drug delivery systems loaded with ticagrelor
Yu-Rim Hwang, *Chungnam National University*

718: Simple preparation of amorphous solid dispersion using polymer and adsorbent to improve the bioavailability of lopinavir/ritonavir combination
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719: Preparation and evaluation of film-coated mini soft capsules containing Omega-3 fatty acid
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Girish Nihalani, *Teva Pharmaceuticals USA Inc. (Actavis Inc.)*

721: Impact of micelization on drug membrane permeation in an oral drug product dissolution/permeation apparatus
Roshni Patel, *University of Maryland*

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723: Solution Engine 2.0: Solubility Enhancement Through Combined Miscibility Modelling, High-Throughput in-vitro Screening and in-vivo PK Studies for Development of Amorphous Solid Dispersions
Firouz Asgarzadeh, *BioDuro-Sundia*

724: Prediction of in vivo pharmacokinetics for ticagrelor sustained-release formulations via extended IVIVC model
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725: Effect of Physicochemical Properties on Sublingual Absorption
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731: Effect of formulation variables on the performance of Dissolvable Microneedles
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752: Localised delivery of weak organic acids for the prevention of urinary catheter infections and blockages.
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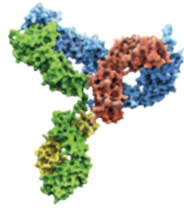
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