

KITP Conference: Structure Design and Emerging Phenomena in Nanoparticle Assemblies: What's next?

(May 15-18, 2023)

Coordinators: Michael Engel, Eran Rabani, Monica Olvera, Laura Na Liu, and Alex Travesset

Monday, May 15, 2023

Towards a Universal Description of Equilibrium Structure and Assembly, Chair: Michael Engel (FAU Erlangen-Nuremberg)

- 8:50am Mark Bowick (KITP) [Welcome\[Video\]\[CC\]](#)
- 9:00am Mario Tagliacozzi (U. Buenos Aires) [Modeling the phase behavior of nanoparticle superlattices with a molecular theory\[Slides\]\[Video\]\[CC\]](#)
- 9:45am Lisa Hall (Ohio State) [Coarse-grained simulations of polymer-grafted nanoparticle monolayers\[Slides\]\[Video\]\[CC\]](#)
- 10:30am **Morning Break**
- 11:00am Zvonimir Dogic (UCSB) [Assembly, disassembly and mechanics of nanoparticle vesicles\[Video\]\[CC\]](#)
- 11:45am Alex Travesset (ISU) [When are Nanocrystals Hard Shapes: The role of Ligands in Nanocrystal Assembly\[Video\]\[CC\]](#)
- 12:30pm **Lunch Break**

In- and Out-of-Equilibrium Colloidal Systems, Chair: Thi Vo (Johns Hopkins U)

- 2:00pm Qian Chen (Illinois U) [Electron videography of nanoparticles in and out of equilibrium\[Video\]\[CC\]](#)
- 2:45pm Xingchen Ye (Indiana) [Dynamics and emergent complexity in self-assembled nanoparticle superlattices\[Video\]\[CC\]](#)
- 3:30pm **Afternoon Break**
- 4:00pm David Limmer (Berkeley) [Nonequilibrium design strategies for functional colloidal assemblies\[Video\]\[CC\]](#)
- 4:45pm Sharon Glotzer (Michigan) [Next steps in patchy particle assembly engineering\[Video\]\[CC\]](#)
- 5:30pm **SHUTTLE TO BWSCI**

Tuesday, May 16, 2023

New Superlattice Structures and their Applications, Chair: Alex Travesset (ISU)

- 9:00am Rob Macfarlane (MIT) [Macroscopic nanoparticle superlattices via self-assembly\[Video\]\[CC\]](#)
- 9:45am Dmitri Talapin (U. Chicago) [Self-assembly of electrostatically-stabilized nanocrystal into strongly electronically coupled supercrystalline solids\[Video\]\[CC\]](#)
- 10:30am **Morning Break**
- 11:00am Tobias Hanrath (Cornell) [Emergent phenomena in semiconductor nanoparticle assemblies\[Slides\]\[Video\]\[CC\]](#)
- 11:45am Dmitry Baranov (Lund U) [Collective X-ray Diffraction and Photoluminescence in Perovskite Nanocrystal Superlattices\[Slides\]\[Video\]\[CC\]](#)
- 12:30pm **Lunch Break**

Frustration Phenomena in Colloidal Assembly, Chair: Michael GrÅ½nwald (U of Utah)

- 2:00pm **Poster Presentation**

3:30pm **Afternoon Break**

4:00pm Ivan Smalyukh (CU Boulder) [Monoclinic nano-colloidal nematic fluids and condensed matter systems by design\[Video\]\[CC\]](#)

4:45pm Xiaoming Mao (U Michigan) [From geometrically frustrated assemblies to metamaterials\[Video\]\[CC\]](#)

5:30pm **RECEPTION**

6:00pm **SPECIAL EVENTS DINNER**

8:00pm **SHUTTLE TO BWSCI**

Wednesday, May 17, 2023

Design of Nanoparticle Assemblies, Chair: Xiaoming Mao (U Michigan)

9:00am Tobias Kraus (INM) [Self-assembling ultrathin nanowires into bundles, fibres, and transparent electrodes\[Slides\]\[Video\]\[CC\]](#)

9:45am Chad Mirkin (Northwestern) [Repurposing the blueprint for life through colloidal crystal engineering with DNA\[Video\]\[CC\]](#)

10:30am **Morning Break**

11:00am Marjolein Dijkstra (Utrecht U) [Accelerating the discovery and design of nanoparticle assemblies\[Video\]\[CC\]](#)

11:45am Grant Rotskoff (Stanford) [Probing thermodynamic stability with generative models: from sampling to coarse-graining and back\[Video\]\[CC\]](#)

12:30pm **Lunch Break**

DNA Nanotechnology for Nanoparticle Assembly, Chair: Tobias Kraus (INM)

2:00pm Alexei Tkachenko (BNL) [Informational matter: from intelligent design to evolution\[Video\]](#)

2:45pm Oleg Gang (Columbia) [Nanoscale systems with programmable architectures and transformation states\[Protected\]\[Video\]\[CC\]](#)

3:30pm **Afternoon Break**

4:00pm Guillermo Ivan Guerrero Garcia (U San Luis Potosi) [Ion correlations and excluded volume effects in aqueous electrolyte solutions with charged nanoparticles\[Video\]\[CC\]](#)

4:45pm Tim Liedl (LMU Munich) Nanoarticles assembled by DNA: from devices to lattices[Embargoed]

5:30pm **RECEPTION**

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8:00pm **SHUTTLE TO BWSCI**

Thursday, May 18, 2023

Nanoassemblies and their Quantum Properties, Chair: Eran Rabani (Berkeley)

9:00am Uri Banin (Hebrew U Jerusalem) [Coupled colloidal quantum dot molecules\[Video\]\[CC\]](#)

9:45am Alexander Efros (Naval Research Lab.) [Dark and photo-conductivity in ordered array of nanocrystal solids\[Video\]\[CC\]](#)

10:30am **Morning Break**

11:00am Victor Klimov (LANL)

[Fundamental and applied aspects of laser diodes based on colloidal quantum dots](#)[\[Video\]](#)[\[CC\]](#)

11:45am Oleg Prezhdo (USC)

[Ab initio excited state dynamics in nanoclusters: semiconducting, metallic and perovskites](#)[\[Video\]](#)[\[CC\]](#)

12:30pm

Lunch Break

Connections to Biology, Chair: Qian Chen (Illinois U)

2:00pm Hannu Häkkinen (U Jyvaskyla)

[Interfaces between atomically precise metal nanoparticles and biomolecules: Prospects and challenges](#)[\[Slides\]](#)[\[Video\]](#)[\[CC\]](#)

2:45pm Gerard Wong (UCLA)

Viral afterlife: SARS-CoV-2 as a reservoir of peptides that re-assemble into pro-inflammatory nanocrystalline complexes[\[Embargoed\]](#)

3:30pm **CONFERENCE END SHUTTLE TO BWSCI *Also available to SB Airport and SB Airbus, Goleta location (See Registration Desk BEFORE THURSDAY to sign up.)**