Università degli Studi di Padova

DiSC

Giovedì **8 maggio 2025** alle ore **15:00** presso l'aula I

il **Prof. Patrick van Rijn**

University of Groningen

terrà il seminario dal titolo:

Nanogels, the ultimate versatile multi-modal biomedical nanomaterial

La presenza della S. V. sarà molto gradita

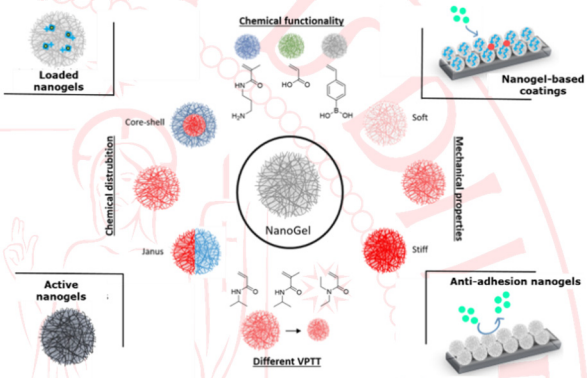
Enzo Menna

Il Direttore del Dipartimento
Stefano Mammi

Nanogels, the ultimate versatile multi-modal biomedical nanomaterial

Nanogels are hydrogel-based nanoparticles that are highly tunable in chemical composition and physicochemical properties[1] and allow for several functions to be combined including antimicrobial properties, fluorescence and MRI imaging, anti-adhesive, controlled release, and responsiveness to various stimuli.[1] Because of this variety of functions and properties, the particles are used in controlled delivery, imaging, theranostic approaches and functional biomedical multi-modal coatings.[1-5] The ease of scaling, the diversity, and ease of applicability make these particles very powerful.

The approach for nanogel formation is by precipitation polymerization, which allows for co-polymerizations as well as control over location of the monomers.[5] Medically relevant attributes such as antimicrobial properties via e.g. quaternization[3,4], inclusion of MRI tracers via peptide coupling can be implemented[5]. By precisely controlling the physicochemical properties such as charge or stiffness, one can utilise it as a carrier but also control the interactions with its surrounding that allows strong and easy applicable coatings using surface activation and electrostatic interactions.



1. Keskin D., *et al* Bioactive Materials, 2021, 6(10), 3634.
2. Ribovski L., *et al* Nanomedicine: Nanotechnology, Biology and Medicine, 2021, 102377.
3. Keskin D., *et al* ACS Applied Materials & Interfaces, 2020, 12(52) 57721.
4. Zu G., *et al* ACS Applied Polymer Materials, 2020 2(12), 5779.
5. Zu G, *et al* Chem. Eur. J. 2020 26(66), 15084.

Patrick van Rijn

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His research interests are developing new dynamic biointerfaces in order to understand the relationship between material properties and cellular behavior. For this purpose, his group developed high-throughput technologies to investigate surface parameter dependent biological phenomena but also created novel coating approaches and delivery strategies using nanohydrogels. The research that is conducted in his group is both of fundamental and applied character with strong connections to the clinic and industry. Patrick has been the chair of the Netherlands Society for Biomaterials and Tissue Engineering (NBTE), program leader for the research program “Nanobiotechnology and advanced therapeutic materials”, topical editor biomedical polymer for the open access journal *Polymers* (MPDI), and Guest editor for *Polymers*, *Bioactive Materials*, and *Tissue Engineering A*. He is also Founder & Chief Scientific Officer of BiomACS B.V. For full research interests, education, and group composition and collaborators, visit vanrijn-lab.nl.

Selected publications

1. L. Yang, S. Pijuan-Galito, H. Suk Rho, A. S. Vasilevich, A. Dede Eren, L. Ge, P. Habibović, M. R. Alexander, J. de Boer, A. Carlier, P. van Rijn*, Q. Zhou*, " High-Throughput Methods in the Discovery and Study of Biomaterials and Materiobiology " *Chem. Rev.* **2021**, 121 (8), 4561-4677.
2. G. F. Vasse, P. Buzón, B.N. Melgert*, W.H. Roos*, P. van, Rijn*, “Single Cell Reactomics: Real-Time Single-Cell Activation Kinetics of Optically Trapped Macrophages”, *Small Methods* **2021**, 2000849.
3. L. Yang, L. Ge, Q. Zhou, T. Mokabber, Y. Pei, R. Bron, P. van Rijn* "Biomimetic Multiscale Hierarchical Topography Enhances Osteogenic Differentiation of Human Mesenchymal Stem Cells" *Adv. Mater. Interfaces* **2020**, 7, 2000385.
4. L. Yang, K. M. Jurczak, L. Ge, P. van Rijn*, "High-Throughput Screening and Hierarchical Topography-Mediated Neural Differentiation of Mesenchymal Stem Cells", *Adv. Healthcare Mater*.**2020**, 2000117
5. Q. Zhou, J. Chen, Y. Luan, P.A. Vainikka, S. Thallmair, S. J. Marrink, B.L. Feringa*, P. van Rijn*, "Unidirectional rotating molecular motors dynamically interact with adsorbed proteins to direct the fate of mesenchymal stem cells", *Sci. Adv.***2020**, 6: eaay2756