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Jena Center for Soft Matter

Chemisch-Geowissenschaftliche Fakultät

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Jena, 3. September 2018

EINLADUNG

Am Freitag, **19. Oktober 2018**, spricht um **12:15 Uhr**
im Hörsaal des ZAF, Philosophenweg 7, 07743 Jena

Herr Prof. Dr. Marcelo Calderon

Institut für Chemie und Biochemie
Freie Universität Berlin

zum Thema

"Breaking the barrier – Efficient topical delivery using thermoresponsive nanogels"

Alle Interessenten sind herzlich eingeladen.

gez. Prof. Dr. Ulrich S. Schubert

Es handelt sich um eine Veranstaltung des SFB 1278 - POLYTARGET
(in Kooperation mit dem Jena Center for Soft Matter - JSCM)

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Curriculum Vitae

Since 2013 Assistant Professor: Department of Chemistry, Free University of Berlin, Germany.
Multifunctional polymers for biomedical applications.

2010-2013 Junior Group Leader. Department of Chemistry, Free University of Berlin, Germany
(Research advisor: Prof. Dr. Rainer Haag). Development of smart nanocarrier systems for biomedical applications.

2007-2010 Post-Doctoral Fellow. Department of Chemistry, Free University of Berlin, Germany
(Research advisor: Prof. Dr. Rainer Haag). Cleavable nanoparticles as intelligent transport system for biomedical application. From laboratory to clinic.

2003-2007 Doctoral Student. Department of Organic Chemistry, Faculty of Chemical Sciences.
National University of Cordoba, Argentina (Research advisor: Prof. Dr. Miriam Strumia). Synthesis and characterization of amphiphilic polymers by dendronization.

1997-2003 Bachelor in Chemistry Student. Department of Organic Chemistry, Faculty of Chemical Sciences. National University of Cordoba, Argentina (Research advisor: Prof. Dr. Miriam Strumia). Synthesis, characterization and studies of matrices to applied in the construction of biosensor

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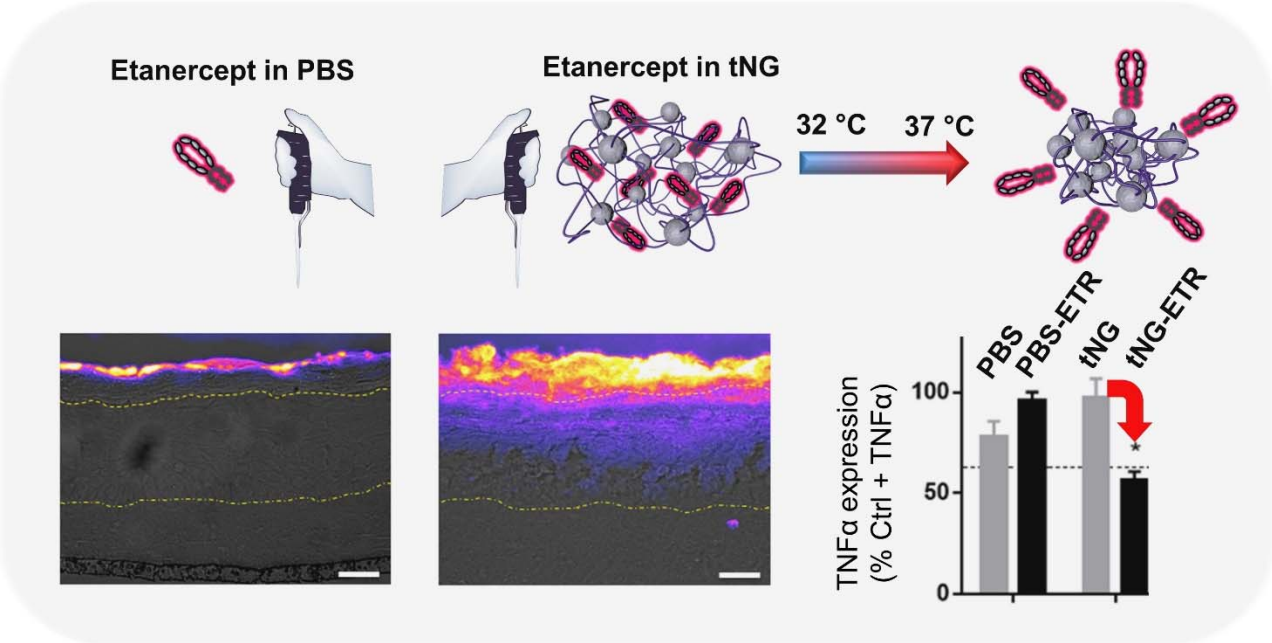
“BREAKING THE BARRIER - EFFICIENT TOPICAL DELIVERY USING THERMORESPONSIVE NANOGELS”

Particulate (or nanoparticle based) dermal and transdermal drug delivery approaches represent nowadays important tools to deliver drugs to the target site, while reducing or eliminating side effects.[1] Nanogels (NGs) represent a promising strategy as modular drug delivery systems. They consist of crosslinked polymer chains and form 3D nano-sized networks capable of taking up large amounts of water. Particularly, thermoresponsive nanogels (tNGs) have been fabricated by our group from dendritic polyglycerol as a macro crosslinker and different thermoresponsive polymers. The investigated tNGs were found to enhance the penetration of fluorescent dyes, used as model drug, without any sign of toxicity.[2] To further evaluate the potential of the thermoresponsive nanogels for the loading and delivery of therapeutic moieties on inflamed skin models, we effectively adapted the previously developed synthetic methodologies to enable the encapsulation of either a highly hydrophobic drug, i.e. dexamethasone, or a biologically active protein, i.e. etanercept. We could demonstrate the high potential of such nanocarrier systems, using excised human skin and reconstructed human skin models.[3]



For the encapsulation and delivery of dexamethasone, a synthetic methodology for the introduction of β-cyclodextrin to the nanogels surface was developed. This approach showed to be advantageous to exploit the complexation of β-cyclodextrin with dexamethasone, along with its role as a cutaneous penetration enhancer. The β-cyclodextrin decorated nanogels were superior in their ability to deliver dexamethasone into the epidermis and dermis and on their pharmacological outcome on skin, compared to a commercially available dexamethasone formulation. Furthermore, the compatibility of the thermonanoprecipitation synthesis with in situ encapsulated proteins could be achieved by a water-in-water nanoprecipitation approach. Etanercept, an anti-TNF fusion protein, could be delivered into reconstructed skin equivalents providing the first evidence for its efficient non-invasive efficacy. Moreover, it could be shown that the delivery of the protein into the viable epidermis occurred explicitly upon its temperature triggered release.

REFERENCES

1. a H. Trommer et al., Skin Pharmacology and Physiology 2006, 19, 106-121; b M. Asadian-Birjand et al., Polym. Chem. 2015, 6, 5827-5831.

2. M. Giulbudagian et al., J Control Release 2016, 243, 323-332.

3. a M. Giulbudagian et al., Theranostics (2018), 8, 450-463. b M. Giulbudagian et al., Nanoscale (2018), 10, 469-479.