

# 学科进展系列报告

## Photon-upconversion nanoparticles for novel bioanalytical applications

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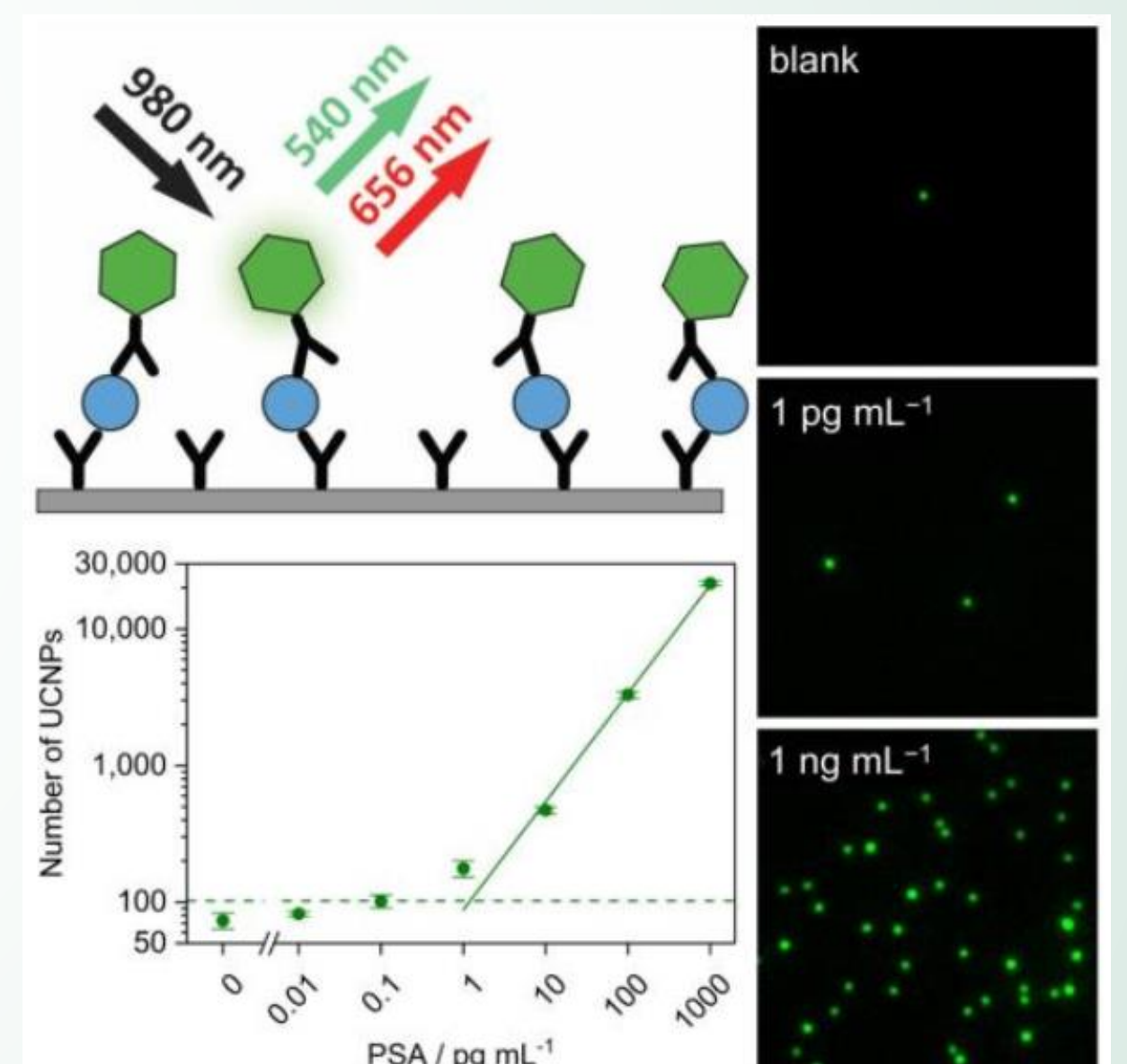
**时 间:** 2018年08月09日星期四下午15:00

**地 点:** 江湾校区化学楼A3030

**邀请人:** 王旭东 研究员

### Abstract

Photon-upconversion nanoparticles (UCNPs) have found wide interest because they emit shortwavelength light under near-infrared (NIR, 980 nm) excitation (anti-Stokes emission), which avoids optical background interference from autofluorescence and light scattering. I will present new (nano-) analytical techniques based on UCNPs. Agarose gel electrophoresis enables the separation of UCNPs that can be detected directly in the gel by a 980-nm laser scanner. UCNP-protein conjugates were purified by agarose gel electrophoresis. Such well-defined nanoconjugates have been used as labels in lateral flow assays and upconversion-linked immunoassays (ULISAs). Such well-defined nanoconjugates have been used as labels in lateral flow assays and upconversion-linked immunoassays (ULISAs). A competitive ULISA allowed for the sensitive detection of the pharmaceutical diclofenac in environmental water samples ( $50 \text{ pg mL}^{-1}$  ( $170 \text{ pM}$ )). UCNPs can be detected at the single nanoparticle level using a relatively simple wide-field upconversion microscope. In this way, it is possible to implement a single molecule sandwich immunoassay for the digital readout of diagnostic markers such as prostate-specific antigen (PSA) with ten-fold lower limit of detection ( $1.2 \text{ pg mL}^{-1}$  ( $42 \text{ fM}$ )) compared to conventional (analog) immunoassays. Figure from *Anal. Chem.* (2017) 89, 11825.



### Biography

Prof. Dr. Hans H. Gorris received his Ph. D degree in University of Lübeck (Germany) in 2005. In 2006-2009 he worked as a postdoctoral fellow at the Department of Chemistry, Tufts University, Medford (USA). Since 2009 he is an assistant Professor at the Institute of Analytical Chemistry, Chemo- und Biosensors, University of Regensburg (Germany). His research interests are bioanalytical assays, fluorescence microscopy, photon-upconversion nanoparticles (UCNPs), single molecule enzymology, single molecule immunoassays.

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