# **Superparamagentic core-shell nanoparticles** as inductive heatable tools for release of chemotherapeutics in medical hyperthermia

Supervisor: Andreas Kirschning, Institute of Organic Chemistry
Co-Supervisor: Franz Renz, Institute of Inorganic Chemistry

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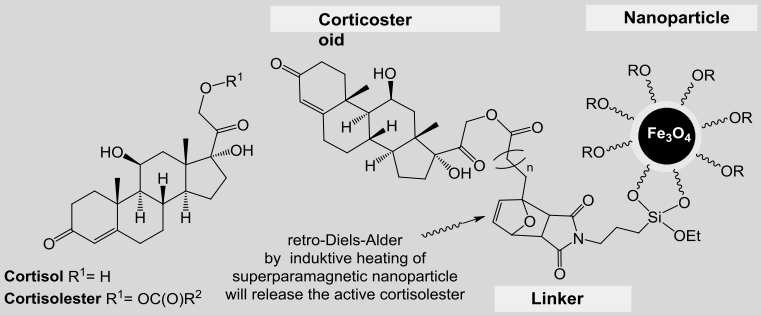
**Abstract:** Nanomedicine is based on the use of nanoparticles or nanostructured materials for medical Applications. Superparamagnetic ironoxide nanoparticles are very mportant systems in modern nanomedicine. They can efficiently be heated by an external oscillating electromagnetic field located outside the body. The present research proposal pursues a new concept that is based on the chemical functionalization of **superparamagnetic nanoparticles** with a drug with different biological and pharmacological properties. The concept aims to achieve a temperature dependent *magnetic-drug-targeting* and – drug-release system by initiating release of the drug through a thermolabile linker. In this context the project pursues two concepts:

1. Design of chemotoxin / iron oxide nanoparticle conjugates for addressing solid tumors by combining hyperthermia with chemotherapy. It is expected to address solid tumors more specifically and with higher effectivity.
2. Design of a cortisol (hydrocortison) / iron oxide nanoparticle conjugates for applications in corticosteroide therapies after sudden hearing loss. Cortisol is a stress hormone which activates catabolic processes. It is usually applied orally or intravenously in large dosis with severe side effects. A thermal release of cortisol at the site of therapy (e.g. in the ear) by an external electromagnetic field would allow to reduce the required dosis. This will be probed in cooperation with Prof. Dr. Omid Majdani at the MHH in Hannover.




This research will be conducted in a team of medicinal chemists and biomedical scientists. The projects will cover: a) Optimization of **iron oxide silica core-shell nanoparticles** for functionalization with complex drugs, b) linker design for facile drug release and c) studies on thermal release of the drug.

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Further reading: Kirschning *et al. Preparation of thermocleavable conjugates based on ansamitocin and superparamagnetic nanostructured particles by a chemo-biosynthetic approach*, *Chem. Eur. J.* **2014,** *20*, 17541–17551.

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This is a PhD-project of the Hannover School for Nanotechnology (hsn). hsn is a coordinated PhD-programme of the Laboratory of Nano and Quantum Engineering from the Leibniz Universität Hannover together with the Hochschule Hannover. Students interested in hsn can apply for fellowships, please refer to the webpage (www.hsn.uni-hannover.de) for details.