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**Doctoral Programme**

<http://solids4fun.tuwien.ac.at/>

## Guest Lecture

### Title:

“Bio-Inspired, Self-Assembled Functionalized Fe<sub>3</sub>O<sub>4</sub> Nanoparticles with Tunable Mechanical Properties”

**Speaker:** Prof. Dr. Gerold Schneider

Address: Institute of Advanced Ceramics, Hamburg University of Technology, Hamburg, Germany

Date: Monday, 15<sup>th</sup> of June 2015

Time: 14:30

Place: Seminar Room CBEG02 (387, Photonics); Gußhausstraße 27

### Abstract:

Nature's hard tissues are typically hierarchical materials with a brick and mortar like structure consisting of hard minerals surrounded by soft organic matter. In nacre or enamel the organic content is as low as 15 Vol.% or even less, which makes these biological materials very hard and stiff while retaining an amazing toughness. It seems that one of the keys of this design concept is based on nature's ability to build up its materials from nanometer sized minerals. We therefore applied this principle to self-assembled 10-20nm – sized Fe<sub>3</sub>O<sub>4</sub> particles functionalized with short ligands. By changing the organic ligands it is possible to tune the strength and elasticity of these hybrid-materials in ranges where they compete with metals and polymers. The cross-linking and grafting of the molecules was evaluated by XPS and FTIR measurements. The arrangement of the particles in grain-like superstructures was investigated by SAXS and TEM measurements.