

**Keramische Werkstoffe und Bauteile**  
**Prof. Dr.-Ing. Kurosch Rezwan**  
**Fachbereich 4 - Produktionstechnik**

**Graduiertenkolleg MIMENIMA**  
**DFG GRK 1860**

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14 .00 – 16.00 Uhr

## Innovations through Processing of Ceramics and Ceramic Composites

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Examples are presented where novel processing is the key for new materials' property profiles and new applications are enabled. New avenues for further research are outlined in these areas. The first example reports on the colloidal processing of micrometer thin tin oxide gas sensors on micro hot plates by microfluidic techniques. They are integrated in microelectronics and operate as electronic noses. Then processes are illustrated for ultra-thin ceramic films and foils enabling micro solid oxide fuel cells for battery replacements with hitherto unrivaled energy densities for portable electronics. The third example reports on the tailoring of Janus-type nanoparticle surfaces in colloids leading to particle foams, emulsions and colloidosomes. With their complex porous microstructures they have potentials for many new applications. The fourth example is inspired by the microstructure of nacre. New layered polymer/ceramic hybrid composites were developed. The resulting ceramic/polymer composite foils combine high tensile strength and high ductility. Finally, rapid prototyping of ceramic teeth restorations and implants from pre-sintered blanks revolutionized dental restoration practice in the past decade. This example demonstrates how rigorous combination of well-known ceramic technologies with modern shape recognition techniques and computer-controlled machining can open up new applications for ceramics.