

## Bachelor Thesis / Master Thesis / Forschungslabor

### Spherical graphene oxide / ordered mesoporous silica / alginate composites for waste water treatment.

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Language: German / English

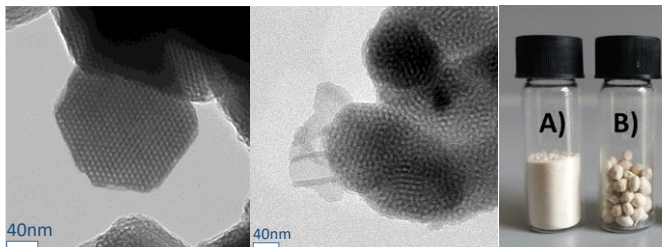
Large amounts of effluent from the textile industry are often discharged untreated to the environment. As the majority of dyes and their degradation products are toxic and harmful to mammals and aquatic creatures, their removal is of global environmental concern. Ordered mesoporous silica (OMS) materials feature characteristics as adsorbents for environmental remediation applications such as high specific surface areas, high pore volumes, tunable pores in the meso-size range, shape and ordering as well as ease of surface functionalization due to surface silanol groups. Shaping powdery nanomaterials with unique surface areas into spheres, facilitates their usage, recovery, reuse, and storage.

In the context of water remediation, the immobilization of silica nanomaterials within a suitable biopolymer matrix is of significance. This thesis concentrates on the synthesis and processing of graphene oxide / ordered mesoporous silica / alginate microspheres in a nonporous and macroporous version and their usage as adsorbents for dye removal.

In this thesis, you will work on:

1. Synthesis of ordered mesoporous silica materials
2. Surface functionalization with graphene oxide
3. Processing of spherical graphene oxide / ordered mesoporous silica / alginate composites
4. Their use as adsorbents for dye removal from waste water (Determination of adsorption capacity, dosage effect, pH effect, kinetics)
5. Characterization of the materials using scanning electron microscopy, gas sorption analysis, small angle scattering, thermal analysis, inductively coupled plasma optical emission spectroscopy, Raman spectroscopy, elemental analysis

Further details to be disclosed in the application process.



TEM images of left)  
ordered mesoporous silica,  
middle) graphene oxide  
functionalized ordered  
mesoporous silica and  
right) powdery ordered