Introduction

Silica particles are used in various applications, such as storage and high-performance catalysis, but also academic applications where silica nanoparticles are used as building blocks for a colloidal gel network. Pure silica particles can be fabricated using different strategies, one of which being the well understood “Stöber process” [1], where a silane such as tetraethyl orthosilicate (TEOS) is added to a mixture of ethanol, water and ammonia. The particle size can easily be tuned by changing the composition of the mixture in order to get monodisperse colloids [2]. Different kinds of organosilica particles have already been synthesized using silanes with a functional group such as amine [3], thiol [4], epoxy [5], etc, but are difficult to synthesize in a monodisperse and uniform manner (see Fig. 1). The particle formation process is not that well understood as for TEOS particles, however they have the advantage of having a high functional group density, which will enable grafting of larger molecules to the particle surface.

In this project, we first want to develop a protocol to synthesize round, monodisperse organosilica particles of a controllable size in a reproducible manner. In a second step, we will investigate the synthesis of rough particles by using a mix of different silane precursors [6].

Methods used in the project

- Chemical synthesis
- Dynamic laser scattering (DLS)
- Thermogravimetric analysis (TGA)
- Scanning electron and atomic force microscopy (SEM/AFM)
- UV-Visibility spectroscopy

Fig. 1. SEM image of organosilica particles

Optimization of organosilica particle synthesis

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References