

Supporting information  
for the manuscript "Interaction between amino-functionalized inorganic nanoshells and  
acid-autocatalytic reactions"

## **1. Synthesis of amino-functionalized hollow nanospheres**

### *1.1 Synthesis of the nanospheres*

Spherical polystyrene (PS) templates were prepared by polymerizing 10 g styrene monomer in 90 ml water in which 0.05 g polyvinylpyrrolidone was dissolved by ultrasonication. The solution was purged by bubbling N<sub>2</sub> gas through it for 15 minutes, then a calculated amount of potassium-persulphate dissolved in 10 ml water was added to the system. The temperature was raised at 1 °C/min heating rate to 70 °C and this was maintained for 24 hours. The spherical product particles were finally obtained by centrifugation and drying under ambient conditions. 2 g of the PS template powder was dispersed in 25 ml water + 30 ml ethanol + 0.625 g cetyltrimethyl-ammonium-bromide + 3.3 ml 25 wt% ammonia solution. 2 ml tetraethyl-orthosilicate was added to the mixture under stirring. The stirring was maintained for 2 hours at room temperature, then the silica coated PS spheres were collected by centrifugation. The PS template was removed by calcining the product for 5 hours in air at 550 °C. This step yielded hollow inorganic silica nanospheres (HINS).

### *1.2 Functionalization*

0.5 g as-synthesized HINS material was dissolved in toluene by vigorously stirring the system for 24 hours in a closed flask. After that, 0.5 g 3-aminopropyltrimethoxysilane was added rapidly to the HINS sol under vigorous stirring that was maintained overnight. The amino-functionalized HINS product was collected by centrifugation and purified by redispersion first in methanol and then in 2-propanol, then finally dried in ambient air.

## **2. TEM characterization of the functionalized nanoshells**

The amino-functionalized silica nanoshells were characterized by scanning and by transmission electron microscopy (TEM). Characteristic TEM images presented in Fig. S1 confirm that the system is monodisperse and that the material indeed consists of a thin spherical shell enclosing an empty, fillable void. Measuring 400 individual shells in the TEM images provided the data that was used for creating the diameter distribution histogram presented in Figure S2. The solid line denotes a Gaussian distribution with a mean diameter of 511 nm and standard deviation of 57 nm.

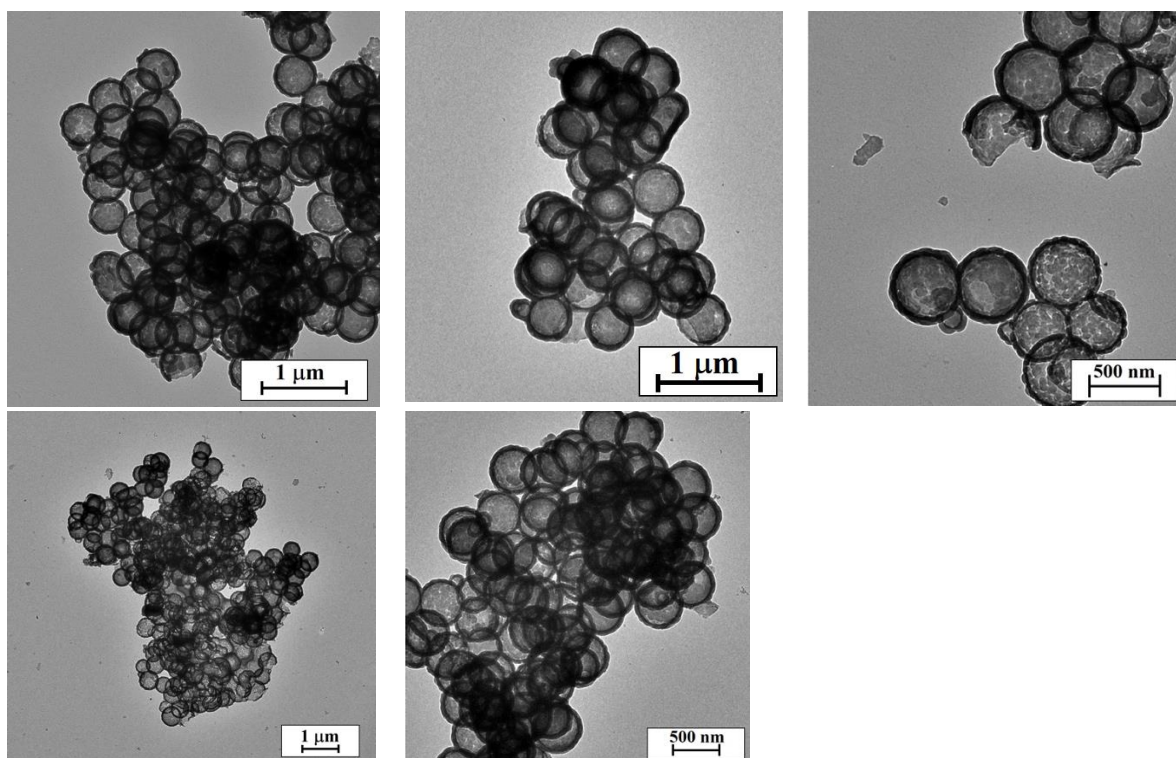


Figure S1. Characteristic TEM images of amino-functionalized HINS particles.

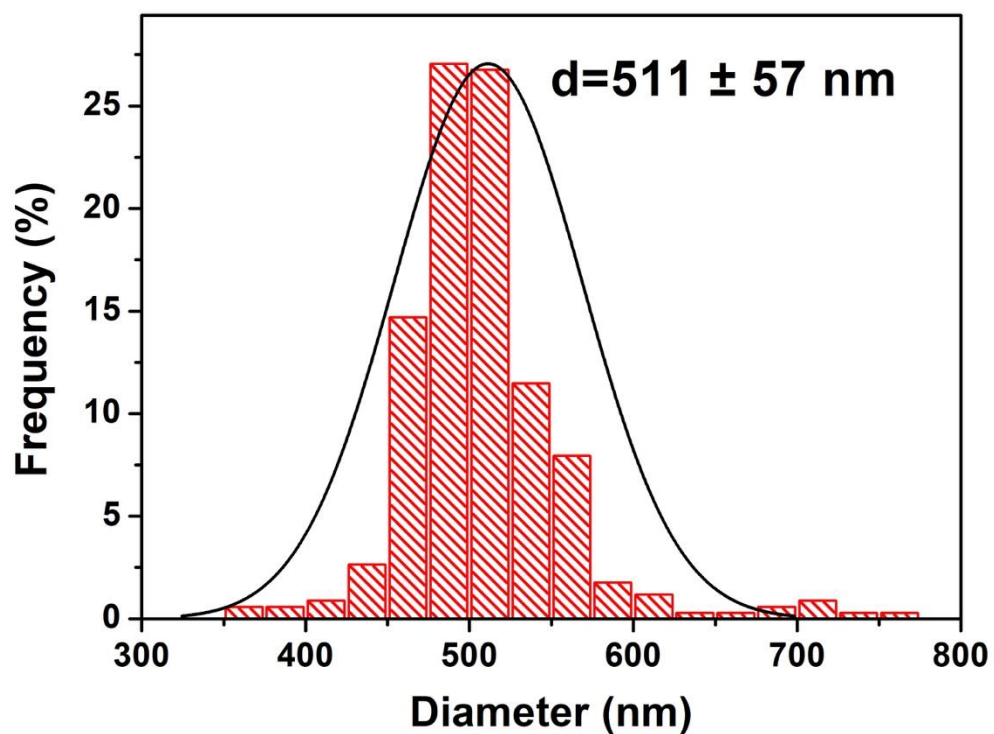


Figure S2. Particle diameter distribution of the HINS particles. The columns of the histogram are based on the TEM data (Figure S1).