Supplementary information

Deposition of silver nanoparticles on organically-modified silica in the presence of lignosulfonate

Grzegorz Milczarek,[a] Mykhailo Motylenko,[b] Anna Modrzejewska-Sikorska,[a] Łukasz Klapiszewski,[c] Marcin Wysokowski,[c] Vasilii V. Bazhenov,[d] Adam Piasecki,[e] Emilia Konował,[a] Hermann Ehrlich,[d] Teofil Jesionowski[c],*

[a] Institute of Chemistry and Technical Electrochemistry, Faculty of Chemical Technology, Poznan University of Technology, Berdychowo 4, PL-60965 Poznan, Poland
[b] Institute of Materials Science, TU Bergakademie Freiberg, Gustav Zeuner 5, D-09596 Freiberg, Germany
[c] Institute of Chemical Technology and Engineering, Faculty of Chemical Technology, Poznan University of Technology, Berdychowo 4, PL-60965 Poznan, Poland, *E-mail address: Teofil.Jesionowski@put.poznan.pl, Phone: +48 61 665 37 20, Fax: +48 61 665 36 49
[d] Institute of Materials Engineering, Faculty of Mechanical Engineering and Management, Poznan University of Technology, Jana Pawła II 24, PL-60965 Poznan, Poland
[e] Institute of Experimental Physics, TU Bergakademie Freiberg, Leipziger 23, D-09599 Freiberg, Germany

Silica support characterization

The size of particles was determined by a Zetasizer Nano ZS instrument (Malvern Instruments Ltd., UK) using the NIBS method. The surface morphology and microstructure of the product obtained were examined on the basis of the SEM images recorded on EVO40 electron scanning microscope (Carl Zeiss AG, Germany). The elemental composition of the products was established using a Vario EL Cube instrument (Elementar Analysensysteme GmbH, Germany), which is capable of recording the percentage content of carbon and hydrogen in sample following high-temperature combustion. The silica obtained was also subjected to determination of their surface area (BET) and total volume of pores as well as mean size of pores using the method of Barrett, Joyner, Halenda (BJH). The measurements were performed on ASAP 2020, made by Micromeritics Instrument Co., USA.

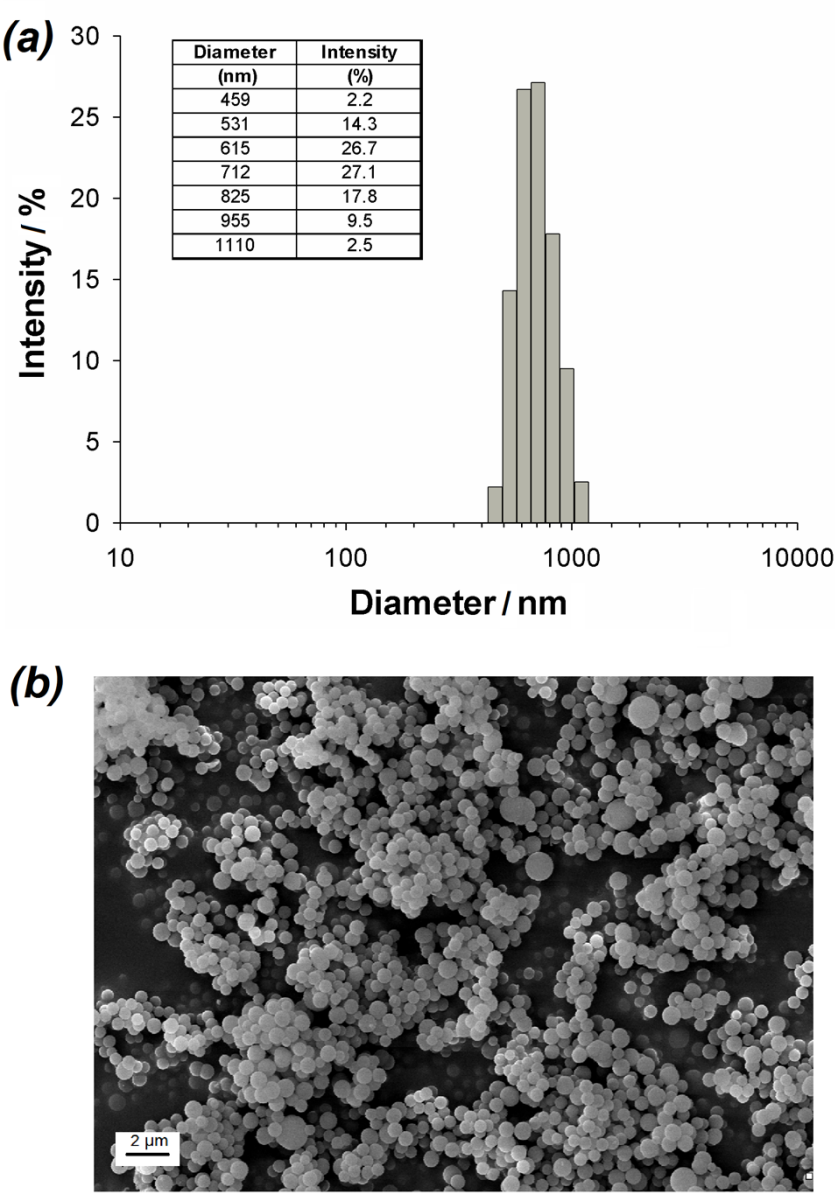

Fig. S1 Particle size distribution (a) and SEM image (b) of silica obtained by the modified Stöber method.

Table S1 Elemental content and porous structure properties of Stöber silica

Elemental content / %		**Porous structure properties**		
C	H	A_{BET} / m^2/g	V_p / cm^3/g	S_p / nm
0.15	1.30	6	0.01	5.7

Lignosulfonate adsorption on organically modified silica

The efficiency of the adsorption of lignosulfonate on both unmodified silica and grafted-silica with selected organic groups was studied by recording the UV-Vis spectra of a lignosulfonate solution before and after adding of silica sample. To promote the adsorption the solution of lignosulfonate with added amounts of silica was agitated by ultrasound. It was then centrifuged and the absorbance of the supernatant was compared with the absorbance of the control solution.

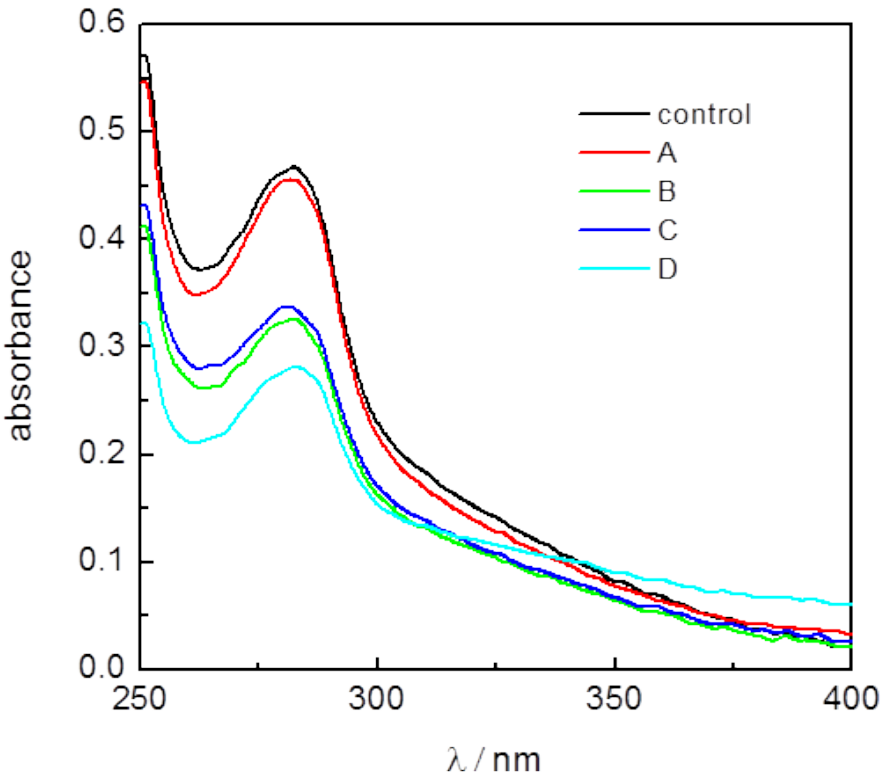

Fig. S2 UV-Vis spectra of lignosulfonate solution before (control) and after contact with solid silica samples (see experimental section for abbreviations).