Novel method of producing highly uniform silica particles using inexpensive silica sources

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In the last few years there has been increasing interest in the production of porous inorganic materials with high surface area. Such materials have potential application in various fields of catalysis, separation, sorption, bioreactor, sensors and so on. Silica is an inorganic material that does not swell and with its good mechanical and thermal stability it can be used in various solvents and have wide applications. In the literature silicon alkoxide or tetraetoxisilane are mainly used as silica sources. The main drawback of using such materials is that they are expensive and therefore production of large quantities of silica would not be cost effective.

In this work silica droplets were successfully produced using The Dispersion Cell with a hydrophobic nickel membrane attached on the bottom of the cell (Fig. 1 a,b). Inexpensive sodium silicate and sulphuric acid were used as silica source (dispersed phase) and kerosene containing 2% Span 80 was used as continuous phase.

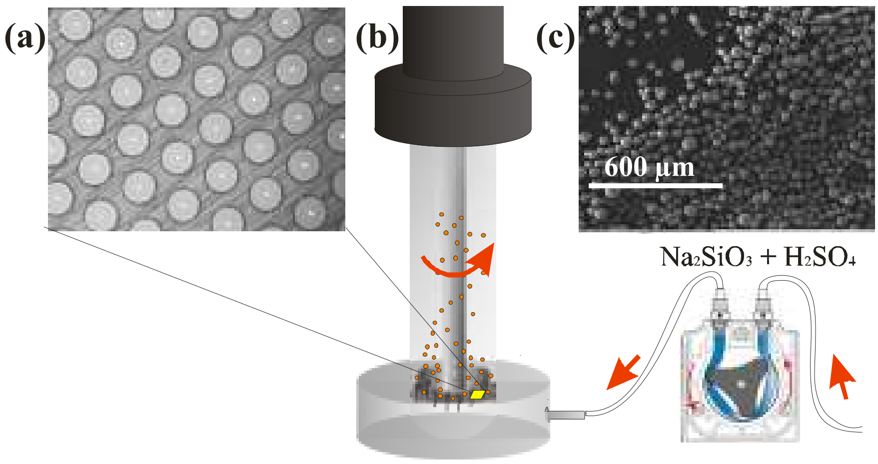

Fig. 1. (a) Hydrophobic nickel membrane with 15 µm pores and (b) Dispersion Cell both kindly provided by Micropore Ltd. UK. (c) SEM of calcined silica particles

By changing the shear stress on the membrane surface liquid silica droplets in the range between 50 and 160 µm were produced. After solidification of silica the particles were washed and dried at room temperature followed by calcination at 550^{o}C. After final drying the produced silica particles were in the range between 30 and 70 µm (Fig. 1c). BET specific surface area of the produced silica after calcination was found to be 750 m^2/g while the average pore diameter was 1.3 nm.

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