Ceramic Macroporous Structures with Controlled Pores

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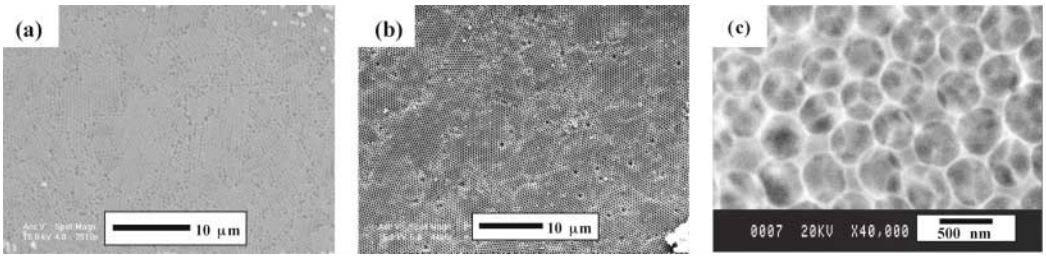
We researched fabrication of porous ceramics with controlled pores with Dr. P. Alberius and Dr. L. Bergström who belong to YKI, Institute for Surface Chemistry, Sweden. Polystyrene (PS) colloidal particles have been used as templates to produce ordered silica macroporous structures. The silica-films were deposited from ethanol solution containing acidic water and tetraethyl orthosilicate. The silica covered PS spheres were characterized using transmission electron microscopy, and the film thickness determined by scanning electron microscopy. Ordered macroporous structures were formed by centrifugation of silica-coated PS spheres. Calcination of the close-packed spheres yielded a continuous silica matrix consisting of a three-dimensional well-ordered network of monodisperse pores.



SEM micrographs of close-packed structures formed by centrifugation of silica-coated PS particles. (a) Prior to calcination; (b) After calcining at 500 °C; and (c) The structure at higher magnification.

The Development of a Multifunctional Energy Efficient Window

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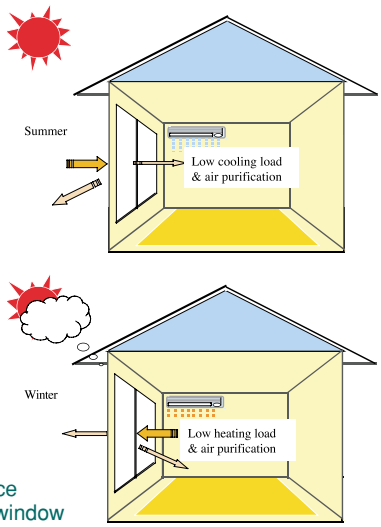
Researches have been carried on to make energy efficient windows which also make the living space more comfortable. We are developing a novel multifunctional window for automatic solar/heat control using a phase-transition material in combination with a photocatalytic coating for antireflection and environmental purification. The window is highly visible transparent, almost totally ultraviolet stopping, with automatic solar/heat control and a variety of photocatalytic performance for environment purification.



Schematic performance of the multifunctional window