

Characterisation of Porous Silicon Nanosponge Particles

Department of Manufacturing and Operations Engineering and Materials and Surface
Science Institute, University of Limerick, Ireland

Edward Chadwick and David A. Tanner

High surface area porous silicon nanosponge particles have recently been prepared from metallurgical grade silicon powder (Irish patent no. IE20060360). This novel material has potential applications in the areas of bio-technology, drug delivery, energetic materials and catalysis. Current research involves characterisation of these nanosponge particles using Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM) techniques to determine the crystallographic structure, composition and pore structure. The effect of processing parameters on these properties is examined in detail. Careful sample preparation techniques for microscopy combined with detailed image analysis using advanced software techniques of the resulting micrographs has allowed detailed comparison with bulk porisometry measurement techniques. Results indicate a disordered pore structure with pore diameters of the order of 10-15nm on particles ranging in size from 4-6 microns. EDS and X-ray diffraction (XRD) have also been applied to determine elemental composition.