

**Mesoporous Materials as Nucleation-inducing Substrates for Protein Crystallization** Naomi E. Chayen<sup>a</sup>, Emmanuel Saridakis<sup>a</sup> Yael Nemirovsky<sup>b</sup> and Larry Hench<sup>c</sup> <sup>a</sup>*Biological Structure and Function Section, Division of Biomedical Sciences, Faculty of Medicine, Imperial College London SW7 2AZ, UK,* <sup>b</sup>*Department of Electrical Engineering, The Technion, Haifa, Israel* <sup>c</sup>*Department of Material Science, Imperial College London SW7 2AZ, UK.*

**Keywords:** protein crystallization; nucleation; mesoporous materials

Protein crystals play a pivotal part in Structural Genomics, hence there is an urgent requirement for new and improved methodology to aid crystal growth. Considerable effort has been invested in the search of substances (nucleants) that will induce efficient heterogeneous nucleation of protein crystals in a controlled manner [e.g. 1-3]. To date, nucleation has been facilitated mainly by seeding, epitaxy, charged surfaces or mechanical means. A different approach is introduced here, involving the use of mesoporous materials that are likely to constrain protein molecules and thereby encourage them to aggregate in crystalline order. Crystals were obtained using such materials at conditions that are not sufficient for spontaneous nucleation [4], for 7 out of 8 proteins that were investigated. We believe that this success is due to the size distribution of pores in the specially designed porous material.

[1] McPherson, A. & Shlichta, P. (1988) *Science* 239, 385-387.

[2] Chayen, N.E., Radcliffe, J.W. & Blow, D.M. (1993) *Protein Sci.* 2, 113-118.

[3] Punzi, J.S., Luft, J. & Cody, V. (1991). *J. Appl. Cryst.* 24, 406-408.

[4] Chayen, N.E., Saridakis, E., El-Bahar, R. and Nemirovsky, Y. (2001) *J. Mol Biol.* 312, 591-595.