Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Growth of divalent metal carbonates at soft organic templates.

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Soft template mediated inorganic mineral nucleation and growth proceeds via specific interactions between the ordered organic lattice headgroups and inorganic constituents at the organic-inorganic interface. We are studying the growth of divalent metal carbonates of R-3 (167) space group from supersaturated solutions under fatty acid, alcohol and glutamic acid rich poypeptide monolayers via in-situ grazing incidence X-ray diffraction and scanning electron microscopy. Previous studies[1] show that the presence of Cd^{2+}, Mn^{2+}, Mg^{2+}, even in small quantities produce highly ordered fatty acid monolayer phases and result in the formation of ionic inorganic superlattices under them. For Ba^{2+}, Ca^{2+} and Co^{2+} the extent of organic monolayer order is lower and no ionic lattice is observed. We now find that the orientation and morphology of bulk crystals grown from supersaturated solutions is strongly correlated to the order induced in organic monolayers by dilute subphases. Headgroup- ion interactions in the dilute phase can thus serve as a better guideline for choosing the monolayer for face specific nucleation as opposed to the proposed[2] geometric and stereochemical match mechanism. 1.Kmetko et al. J. Phys. Chem. B 105, 10818 (2001). 2. Mann et al. Science, 261, 1286 (1993).

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Date submitted: 29 Nov 2005

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