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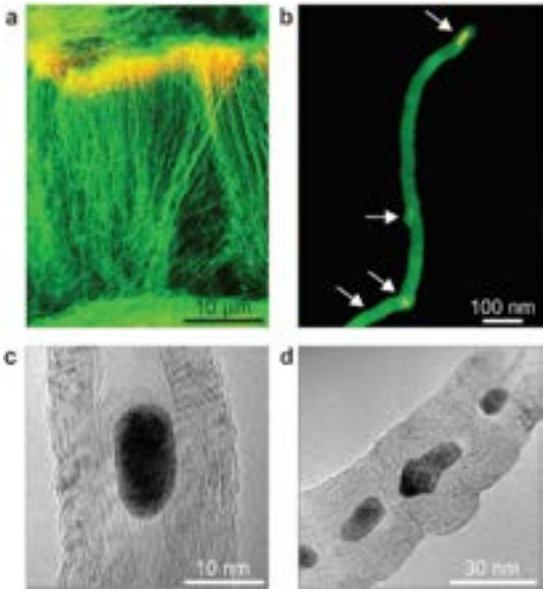
Laser-induced periodic surface structures – A tool for functional materials synthesis

Laser-induced periodic surface structures (LIPSS) are a versatile tool to tune physical surface properties of a wide range of materials; Optical, magnetic, conductive properties to name the most important ones. LIPSS formation in dual and multilayer systems expands the range of modifications possible. At somewhat higher energies than necessary for LIPSS formation other surface modifications appear. We showed that the full range of colors in the visible and near IR is possible to realize on stainless steel, a green method to laser color these surfaces. Generation of nanowires is one of the other options available with LIPSS. For example sub-wavelength wide nanowires of gold and silicon have been realized. The theoretical background is reasonably understood, but for complex systems these theories need further elaboration. Very interesting are uses were the LIPSS process just serves as an enabling tool for advanced applications. In Fig. 2 the growth of carbon nanotubes catalysed by iron oxide nanoparticles prepared in situ. Principle of the LIPSS process and pulsed laser induced dewetting (PLiD), B)CNT growth. a) Cross-sectional SEM view of CNTs (green) and iron oxide nanoparticles (orange) visualizes the nanoparticle catalysts at the tips of the CNTs. b) Tip region of an individual CNT. c) TEM image of a catalyst particle inside a multiwalled CNT. d) TEM imaging of multiple catalyst particles in the tip region of a MWCNT.



Biography

Norbert Hampp has completed his first PhD in 1986 in Pharmaceutical Biology and his second PhD in 1992 in Physical Chemistry. Currently he serves as dean of the chemical department at Marburg University, Germany. He has published more than 220 papers in reputed journals. He filed 19 patent families.

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