HIEHARCHICAL SELF-ASSEMBLED STRUCTURES FROM BLOCK COPOLYMER/METAL NANOPARTICLES HYBRID MATERIALS INDUCED BY VUV LIGHT

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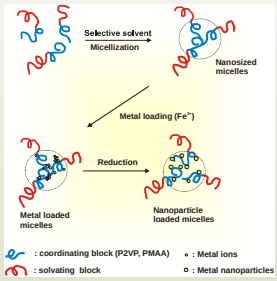
Abstract

Thin films of block copolymer/iron metal nanoparticles hybrid organic-inorganic materials were prepared by a combination of wet chemistry, involving metal nanoparticle formation in block copolymer micellar templates and physical processing via casting or spin coating and laser illumination in the VUV spectral region. A variety of self-assembled structures in the nanometer to micrometer scale were observed by imaging techniques, including TEM, SEM and AFM. Investigations show a closely related hierarchy of the structures formed in the different length scales. These self-assembled structures hold a large potential for nanotechnological applications.

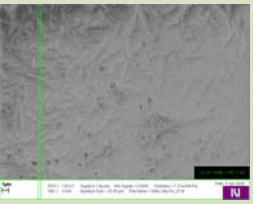
Experimental set up

X-Y-Z micro-illumination VUV stage-chamber

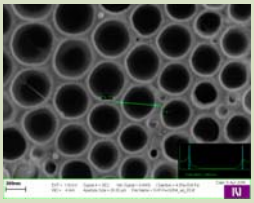


Results

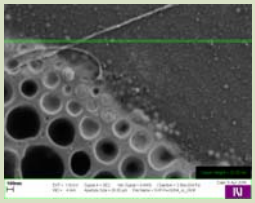
NON EXPOSED



SMA-2Ap-04



SVP--N2-H4



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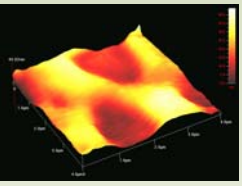
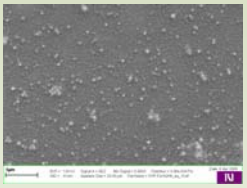
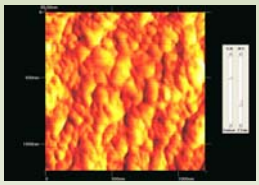


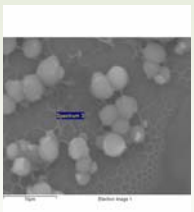
SF- AC



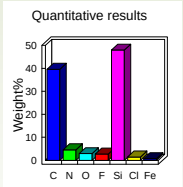
SVP--N2H4

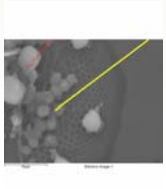


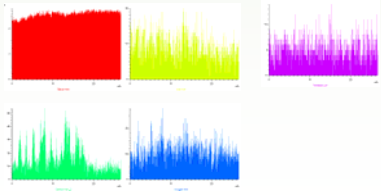
PVC

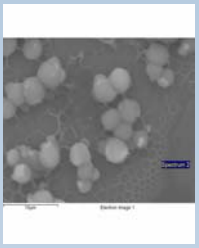


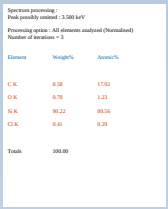
SVPsp. coated N2H4

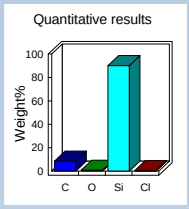




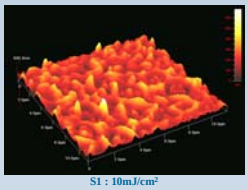




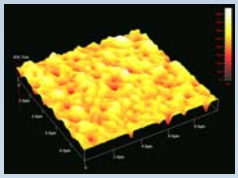




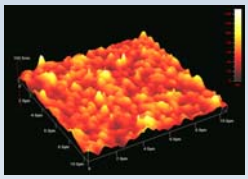
EXPOSED AT 157nm



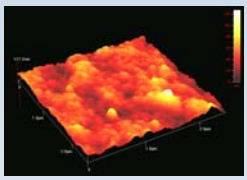
S1 : 10mJ/cm²



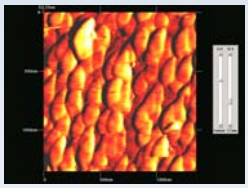
S1: 1mJ/cm²



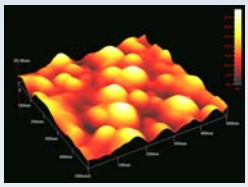
S1: 0.1mJ/cm²



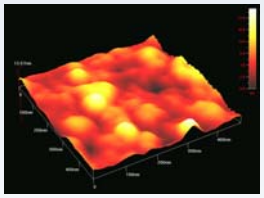
S1: non exposed



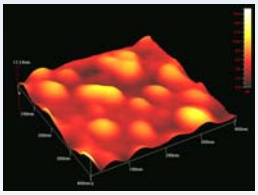
S2: 1mJ/cm² 1min



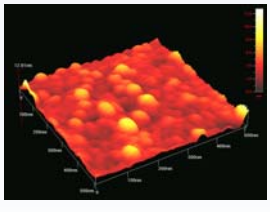
S2: 1mJ/cm² 15 min



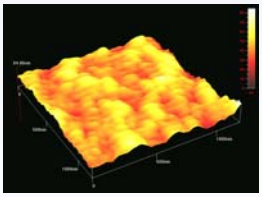
S3: 1mJ/cm² 2 min



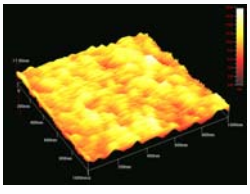
S3: exposed 1mJ/cm² 4 min



S3: 1mJ/cm² 15 min



S3: non- exposed



Polymer only