

Structured surface coatings by sol-gel phase separation

Triin Kangur^{1,2}, Martin Timusk^{1,2}, Liis Nurmis¹, Valter Kiisk¹, Martin Järvekülg^{1,2}

¹Institute of Physics, University of Tartu, Estonia

² Estonian Nanotechnology Competence Centre

e-mail: kangur@ut.ee

We present our results in nano- and microstructural design of silica materials by synthesis strategies based on phase separation in sol-gel system. While this method allows to prepare relatively complex architectures and multifunctional materials, the preparation method is essentially simple, inexpensive and adaptable to large-scale production.

We have used the sol-gel phase separation principles and spraying technique in a novel method for patterning substrates with round silica features [1]. Silica domes are formed through silica-rich phase nucleation in continuous solvent-rich phase and further growing as polymerization proceeds and solvent is evaporating. It is possible to vary the diameter of domes (Fig.1) with narrow size distribution from about 200 nanometers to micrometer by modifying precursor solution and spraying parameters.

Structured coatings resemble the surfaces of lotus leaf and moth-eye, which are known for their non-wetting and anti-reflective properties [2]. According to this, prepared coatings show hydrophobic characteristics and optical functionality is also achieved as each surface feature act as a len. These patterned surfaces can thus be used as structured diffusive, light trapping or anti-glare coatings.

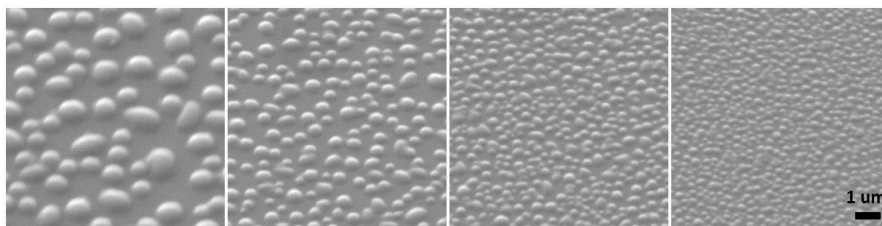


Fig.1 Silica domes with different diameters.

References

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2. K. Yu et al., Progress in Materials Science **58**, 825 (2013)