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Effect of self-affine morphology of natively oxidized Silicon (100) on wetting, scaling properties and DNA fractal dimension**Indrani Mishra**

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Experimental results on the behavior of wetting on self-affine surfaces of natively oxidized Silicon (100) are presented. The self-affine surfaces have been prepared by the technique of ion irradiation. These surfaces, as results show, present hierarchical multi-scale rough morphologies, not observed earlier for hydrophilic surfaces. They further demonstrate a wetting behavior which depends on the fractal dimension of the surface after irradiation. Results show that structural properties and fractal dimension of DNA molecules, immobilized on the self-affine surfaces, are effected by the fractal dimension and morphology of the surfaces prior to immobilization. The surfaces are self-affine in nature and show hydrophilic behavior. The results presented here show that these surfaces exhibit multi- scale roughness with hierarchical structures. The wetting behavior of water droplets shows a dependence on the fractal dimension of the surface after irradiation. Results on the Si/SiO_x surfaces, after DNA immobilization, are also presented. The surfaces do not demonstrate any hierarchical roughness after immobilization and rather exhibit two dimensional flat-smooth morphology. Modifications in the fractal dimension of DNA on these surfaces are also explored. Present studies can have technological implications for many bio-applications.

Recent Publications

1. Interactions of DNA molecule with oxide nano structures. I Mishra, S Majumder, A Manna, S Varma AIP Conference Proceedings 2005 (1), 020010 (2018)
2. Formation of Anisotropic Nanostructures on Rutile TiO₂(110) Surfaces and Their Photo-Absorption Properties. V Solanki, SR Joshi, I Mishra, D Kanjilal, S Varma Metallurgical and Materials Transactions A 49 (7), 3117-3121 (2018)
3. Optical studies of cobalt implanted rutile TiO₂ (110) surfaces. SR Joshi, B Padmanabhan, A Chanda, I Mishra, VK Malik, NC Mishra, ... Applied Surface Science 387, 9
4. Oxygen vacancy mediated enhanced photo-absorption from ZnO (0001) nanostructures fabricated by atom beam sputtering. V Solanki, SR Joshi, I Mishra, D Kabiraj, NC Mishra, DK Avasthi, S Varma Journal of Applied Physics 120 (5), 054303 (2016) 38-943 (2016)

Biography

Indrani Mishra have worked on various techniques like ion irradiation, UV irradiation and plasma etching to modify surfaces of SiO_x, TiO₂ and PDMS in order to enhance its properties for application as biosurfaces and biosensors. The modified surfaces were interacted with plasmid and branched DNA, also interaction of fibroblast cells with plasma modified surfaces has been studied. She has been working with X-Ray Photoelectron Spectroscopy (VG SYSTEM) and Multimode Atomic force Microscopy (from Bruker with a Nanoscope V controller). She has experience of operation and data analysis of XPS and AFM and contact angle measurements. Apart from this she is acquainted with operation and data analysis of Raman, UV visible, pl and XRD systems. She wish to explore the interaction of biomolecules with nanoporous materials, as these materials due to their large surface area, controlled pore size distribution, controllable pore structure and versatile composition has attracted increasing applications in bioengineering, catalysis and biosensing area.

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