

Biomaterials

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DNA fractal dimension

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Experimental results on the behavior of wetting on self-assembled surfaces of natively oxidized Silicon (100) are presented. These self-assembled 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-assembled surfaces, are affected by the fractal dimension and morphology of the surfaces prior to immobilization. These surfaces are self-assembled 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/SiO₂ surfaces, after DNA immobilization, are also presented. These 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