

Abstract Submitted
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Influence of self-ordered Au nanoparticles on chemically textured Si surfaces with improved antireflection and hydrophobicity. CHETAN SAINI, ARABINDA BARMAN, PhD student, MOHIT KUMAR, Research Associate, B. SATPATI, Scientist G, T. SOM, ALOKE KANJILAL, Professor — A facile approach to improve hydrophobicity of chemically etched Si pyramids is presented by introducing Au nanoparticles (NPs). Initially, a clear transformation of pristine Si from hydrophilic to hydrophobic is established by chemical texturing, and manifested by observing an increase in contact angle (CA) from 58° to 98° . X-ray diffraction studies reveal the evolution of a tensile strain in microscale Si pyramids followed by the formation of conformal Au layers without showing any significant change in CA (96°). However, the development of Au NPs with additional self-ordered structures at the pyramid edges at 400°C gives a sharp rise in CA up to 118° , while the underlying phenomenon has been discussed in the light of a decrease in solid fractional surface area according to the Wenzel model. Detailed transmission electron microscopy investigations, however, suggest that Au and Si are immiscible at the Au/Si interfaces. Moreover, a sharp reduction of specular reflectance, especially in the ultraviolet region up to 0.4 % has been manifested from ultraviolet-visible spectroscopy and discussed in details.

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