

Surface Modifications Using Slow Highly Charged Ions

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The irradiation with highly energetic (MeV-GeV) heavy ions can lead to the modifications of the properties of different materials [1]. Among the observed effects, the creation of surface nanostructures in different materials were demonstrated [2]. Recently, slow (eV-keV) highly charged ions (HCIs) were successfully utilized for the creation of similar surface nanostructures in various solids [3,4]. However, HCI exhibit unique feature by altering only the top surface layers without modifying the deeper layers, which can not be avoided for MeV-GeV heavy ions. Based on both the type of the material and ion beam parameters (charge state, kinetic energy, potential energy, etc.), nanostructures of different shapes (pits, caldera-like, hillocks) and sizes were obtained. This paper reviews the research progress of HCI-induced nanostructuring and the used theoretical approaches for understanding the creation mechanisms of the fabricated surface structures.

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