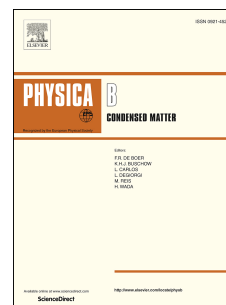


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Influence of obliquely incident primary ion species on patterning of CoSi binary mixtures: An experimental study

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Abstract

Nanostructure evolution on binary material surfaces using low energy ion beams is being intensively studied recently owing to the varied forms of structures obtained as well as its immense potential applicability in various fields of research. The present work aims to investigate ion induced pattern formation at different angles of incidence on binary systems. We report nanostructure formation during low energy ion erosion of compositionally varied $\text{Co}_x\text{Si}_{1-x}$ (in the ratios of 43:57 and 64:36) binary mixtures with Ar^+ (700 eV) and Xe^+ (500 eV) ions respectively at a constant fluence of 7.5×10^{18} ions cm^{-2} . Pre- and post-irradiated surfaces have been studied using Atomic Force Microscopy (AFM). Specifically, in these measurements we have demonstrated the role of incidence angle in surface nanostructuring. For near normal incidence of Ar^+ ions, smoothening is observed for the irradiated samples. As we go to higher incidence angles, ripple formation is observed which transforms into spherical hump-like structures at grazing incidences. In contrast, for Xe^+ ion irradiation, emergence of periodic structures is hardly observed for the range of incidence angles studied. It is observed that the development of roughness with incident angle is notably prominent for Xe^+ than Ar^+ ions. Our results could demonstrate that low energy oblique incidence ions having lighter mass can generate varied nanostructures on binary materials which could potentially be used for further applications.

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