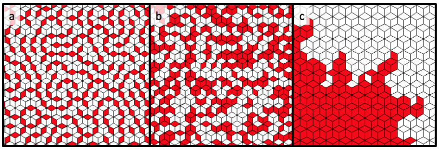

Figure 1. Schematic visualization of three imaginable propagation types. The image shows snapshots from (a) dimerization-like, (b) random-like and (c) nucleation-like polymerization propagations. Although all three models exhibit the same average structure, they have very different real structures.

Keywords: Disorder; Diffuse Scattering; PDF; Polymer

MS21-P8 Order change and phase's redistribution in single crystal of Ni-based superalloy during hard cyclic viscoplastic deformation

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The X-ray investigation of cuts and spheres of complex alloyed single crystal (SC) of Ni-based superalloy ZS-32 have been carried out for samples with identical solidification parameters prior to identical casting conditions and after different levels of hard (tension-compression) cyclic viscoplastic (HCV) deformation. The microstructure evolution of the cast samples have been studied in a plane, parallel to solidification direction, using optical microscope (Nikon Microphot-FX) and scanning electron microscope (Zeiss EVO MA-15) equipped with energy dispersive spectrometer (EDS) system for local chemical composition determine of different phases. The lattice constant and atomic occupancy have been determined use Siemens and CCD single crystal diffractometer Xcalibur with MoK-alpha-radiation. The 7000-8000 Bragg reflections have been collected in full Evald sphere. The micromechanical properties of the phases have been determined using the nanoindentation data (NanoTest NTX testing centre of Micro Materials Ltd.) after deformation. The results indicate that the interdiffusion of additive atoms have been found during HCV deformation at room temperature. It is shown that the phase's microstructure was homogenized and micromechanical properties changed. We suggesting that are due to result of atoms interdiffusion between different phases, which initiating via microstresses increase during HCV deformation. After deformation appear small pores and defects as result of atoms non balanced interdiffusion. Our experiments have shown the change in atomic order after deformation. We suppose that both the change in atomic order and the shift in the phase equilibria of Ni-based superalloys determine changes in the phase's micromechanical properties and evolution of microstructure characteristics. XRD peaks of the formation of a new proof of the formation of microstructural rafting, defects like micropores and grain boundaries. The material with SC microstructure becomes to polycrystalline microstructure. A mechanism of subsequent fracture includes the above-mentioned phenomena when occur the increasing of cumulative strain during HCV deformation.

Keywords: Order, Ni-based superalloy, interdiffusion, rafting, fracture mechanism