

IRRADIATION EFFECT OF INTENSE PULSED ION BEAM ON (TiZrNbTaCr)C*

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Intense pulsed ion beam (IPIB), featured with pulsed high-power density, has been widely used in the modification of materials. The influence of IPIB irradiation on surface microstructure and phase structure of (TiZrNbTaCr)C ceramics was investigated in this work. Experiments were carried out using TEMP-4M accelerator with peak accelerating voltage, current density, and pulse duration (FWHM) of 220 kV, 150 A/cm², and 80 ns respectively. Atomic force microscope (AFM), scanning electron microscope pulse and Energy-dispersive X-ray spectroscopy (SEM+EDS), as well as X-ray diffraction (XRD) will be used to analyze the surface microstructure and phase structure of (TiZrNbTaCr)C ceramics under IPIB irradiation. The AFM images indicated that the grain size of (TiZrNbTaCr)C increased after IPIB irradiation which might improve the hardness and erosion resistance of material. The possible defects including micro-cracks and micro-craters caused by IPIB irradiation on surface will be analyzed according to SEM images. The influence of IPIB irradiation on elements distribution of samples will be analyzed based on EDS measurements. The phase structure stability of samples under IPIB irradiation will be analyzed by XRD and the lattice parameters, crystalline size, and micro-strain will be discussed as well. The evolution of surface structure and phase structure with pulse number will be summarized.

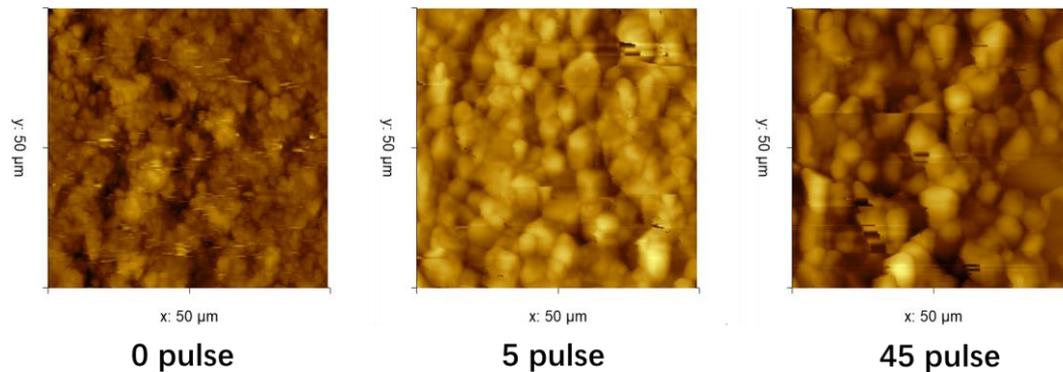


Fig.1. AFM images of original samples, and after 5 and 45 pulses IPIB irradiation

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