

## RADIATION PROCESSES AND PHENOMENA IN NANOCOMPOSITE COATINGS

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The development of technologies directly related to the radiation exposure to the various structures as specifically and spontaneously is actively conducted in recent years. Different protective coatings with the enhanced radiation stability are developed. In our work we propose a new concept of nanocomposite coatings as promising radiated resistant materials. The main idea of the work is connected with producing of a large number of the structural defects like grain boundaries that are effective absorbed primary and secondary defects formed after irradiation. The coatings for the experimental research were made by magnetron sputtering of metal (Zr, Al, Ti) and Si targets in the argon + nitrogen atmosphere. In this case a nanocomposite structure like amorphous  $\alpha$ -Si<sub>3</sub>N<sub>4</sub> matrix with embedded nanocrystalline particles of the metals nitrides ZrN, TiN, AlN was formed. The coatings were subjected to the ions (Xe<sub>2</sub><sup>+</sup>, Ar<sup>+</sup>, He<sup>+</sup>) irradiations with different energies and doses up to 10<sup>17</sup> ions/cm<sup>2</sup>. The unique nanocomposite structure allows to decrease in the primary defects number enhancing, in turn, the stability of the phase composition of the coatings under the irradiation.

**Keywords:** Radiation stability, Thin films, Nanocomposite materials.