

ATOMIC LAYER DEPOSITION OF THE $\text{Cr}_x\text{Al}_y\text{O}$ FILMS.

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The use of the Cr_2O_3 and Al_2O_3 thin films in various technological applications as protective coatings, catalytic systems, optics, cutting tool, and as thermal or diffusion barrier coatings is constantly studied [1-3]. In all of them the increase of the mechanical properties could be important as it can prolong the lifetime and widen the application options. Therefore, in the current research, the possibility to increase the elastic modulus and hardness of the Cr_2O_3 and Al_2O_3 films by doping them with each other is studied. The Cr-Al-O films have been grown on Si substrate at 275 °C using atomic layer deposition. This method is used due to the possibility to control the film composition and thickness in sub-nanometer level. The GIXRD patterns of the deposited films showed crystalline microstructure only in case of the binary Cr_2O_3 film, however, in all other cases the films were amorphous (Fig. 1). Nevertheless, the increase in hardness of films from 14.2 to 18.4 GPa was observed, using nanoindentation method, by increasing Al/(Al+Cr) atomic ratio in the films from 0 to 0.40.

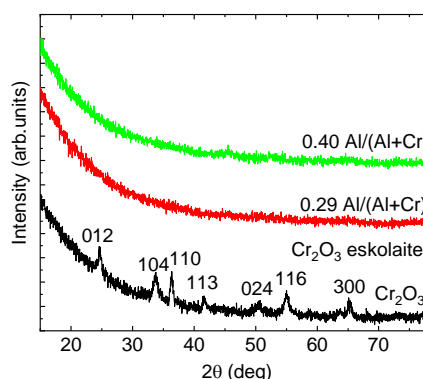


Fig. 1. GIXRD patterns of Cr-Al-O films on Si.

References

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