CREATING COMPOSITE MICRO-POWDERS WITH A "SEMICONDUCTOR-DIELECTRIC" COMPOSITION USING THE SOL-GEL METHOD

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Relevance. The creation of composite micro-powders with a "semiconductor-dielectric" composition using the sol-gel method holds significant relevance in various fields, particularly in electronics and optoelectronics [1]. This innovative approach offers numerous advantages and opens up new possibilities for the development of advanced materials with tailored properties.

Goal of the work – The morphological composition and potential applications of xerogels and powders based on them containing nanoparticles of reduced materials obtained using the sol-gel method were studied.

Result analysis – The process of creating composite micro-powders with the compositions of "metal-dielectric" (SiO_2:Cu^o) and "semiconductor-dielectric" (SiO_2:CuO) was optimized using the sol-gel method. These micro-powders are meant to be pelletized targets that will be coated in vacuum using the evaporation electron beam or magnetron sputtering method. In actuality, the composite composition tablets were prototypes for targets to be sputter-deposited in a vacuum, created by uniaxial semi-dry pressing based on SiO_2 xerogels containing copper oxide or reduced copper of different proportions. When obtaining target samples, the press's hydraulic system was operating at a pressure of roughly 120–125 kg/cm^2. For electron beam and magnetron sputtering, the tablets' diameters were 12 and 85 mm, respectively, and the chemical purity of the xerogel micro-powders matched the "special purity" grade. SiO_2:CuO was the sole composition that produced targets with an 85 mm diameter; SiO_2:CuO and SiO_2:Cu^o were achieved for targets with a 12 mm diameter.

Conclusion. Notably, one of the potential applications of the synthesized materials can be resistive targets as well as resistive powders (pastes) obtained by their basis. The research resulted in the technological synthesis of the sputtering activity of targets developed and obtained from them into films formed by sputtering in a vacuum.

Литература

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