

## 3D VISUALIZATION OF THE EFFECT OF PLASMA TEMPERATURE ON THIN-FILM MORPHOLOGY

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*The impact of plasma temperature as a sputtering deposition parameter on the thin film morphology has been studied using a Monte Carlo (MC) simulation model. The plasma gas was argon (Ar), while three materials (Cu, SiO<sub>2</sub>, and GaN) represented conductors, insulators, and semiconductors were used as targets. The model estimates the flow of ejected atoms as they reach the substrate, their energy, and their positions. Furthermore, while investigating the deposition rates of the material atoms, the influence of the gas temperature factor inside the vacuum chamber on magnetron deposition performance and hence the quality of the obtained films were explored.*

**Keywords:** sputtering technique, Monte Carlo (MC) simulation, thin-films, plasma gas, thin layer deposition.

1. *Introduction.* The sputtering deposition is a commonly used technique for manufacturing a wide range of thin films of metals, semiconductors, and dielectric materials, including magnetic films and high-critical temperature superconducting films, on a wide range of substrates. It is handy for preparing multilayered films due to its good controllability of each surface area in multilayered structures. Sputtering can be used in film deposition applications to apply thin film coatings of target material on surfaces to improve their mechanical, thermal, or optical qualities [1–6].

Compared to the analytical technique, the MC simulation approach provides higher diagnostic validity and saves time, especially for considerable changes...

Поступила в редакцию 25 июня 2022 г.

После доработки 23 ноября 2022 г.

Принята к публикации 24 ноября 2022 г.