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Research of plasma discharge process of magnetron sputtering coating for NEG film in the IAU vacuum chamber

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The non-evaporable getter (NEG) film deposited on the inner wall of the vacuum chamber using magnetron sputtering has been widely used in the fourth-generation synchrotron radiation light source to obtain and maintenance ultra-high vacuum in narrow vacuum chambers. The IAU vacuum chamber has a small cross-sectional size and a long length. It also needs to deposit a NEG film to meet the needs of ultra-high vacuum. Due to the limitation of cross-sectional size, it is difficult to obtain magnetron sputtering discharge and optimal coating parameters through experiments. In order to obtain clear discharge boundaries and optimal discharge parameters, the PIC-MCC method is used to conduct numerical simulations to determine the boundaries of discharge parameters. Taking a reasonable shell thickness and a lower discharge voltage as optimization goals, the optimal discharge parameters are determined and an experimental device is established. The spectral changes of Kr I and Kr II are measured with a spectrometer to verify the reliability of the numerical simulation and provide theoretical and data support for the next step of engineering coating implementation.

Footnotes

Funding Agency

Paper preparation format

Region represented

Asia

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