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Surface resistance measurement of Pd coating films using cavity resonator method

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Recently, it was found that Pd coating films exhibited ultra-low photon-stimulated desorption and low resistivity values. These advantages suggest that Pd coatings could be applied to small aperture tubes, including undulator vacuum tubes, which have a significant effect on resistive wall impedance.

In previous studies, the DC electrical resistivity of Pd films was measured using the four-probe technique. The surface resistance under high-frequency conditions relevant to accelerators remained insufficiently explored.

This study aims to address this gap by employing the "cavity resonator method"to measure the surface resistance of this film under high-frequency electromagnetic fields. By depositing Pd films onto the inner surface of a copper alloy resonator, the quality factor (Q-factor) was measured and compared to that of the uncoated copper alloy, allowing for the calculation of the practical surface resistance. These results could provide a basis for evaluating the heat generation and cooling requirements of this film in accelerator applications.

Footnotes

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