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Additive manufacturing for seamless 6 GHz Nb/Cu cavity

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Additive Manufacturing (AM) offers a unique way of fabricating components with intricate geometries and enables the use of materials that are otherwise difficult to machine or process due to high melting points. Within this context, recent work at INFN-LNL and INFN-Padova focused on the fabrication of a seamless 6 GHz copper cavity using AM techniques. This study investigates the feasibility of fabricating a geometrically complex structure (such as an elliptical RF cavity) without internal supports, while demonstrating compatibility with ultra-high vacuum (UHV), superconducting coating, and cryogenic operation. The cavity underwent successful internal polishing via Plasma Electrolytic Polishing (PEP) and passed standard leak tests. After polishing, a thin niobium (Nb) coating (˜ 3 μm) was deposited at low temperature (˜ 300 ℃). The film delaminated during the post-coating High Pressure Rinsing (HPR), therefore the RF test of the cavity could not be performed at this round. A new deposition run will be carried out at a higher deposition temperature and increased film thickness, with the goal of improving adhesion and mechanical stability of the film.

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Yes

Footnotes

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