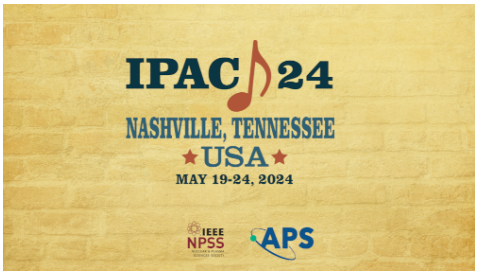

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Development of a plasma simulation tool for accelerating cavities

Wednesday, 22 May 2024 16:00 (2 hours)

Plasma processing of superconducting radio frequency (SRF) cavities has shown an improvement in accelerating gradient by reducing the radiation due to field emission and multipacting. Plasma processing is a common technique where the free oxygen produced by the plasma breaks down and removes hydrocarbons from surfaces. This increases the work function and reduces the secondary emission coefficient. The hydrocarbon fragments of H2, CO, CO2, and H2O are removed from the system with the process gas which is flowing through the system. Here, we present COMSOL for the first time to simulate the plasma processing of an SRF cavity. In this work, we use Jefferson Lab's C75 SRF cavities design as our case study. Using simulation, we predict the condition of plasma ignition inside the SRF cavity. The simulation provides information about the optimal rf coupling to the cavity, mode for plasma ignition, choice of gas concentration, power, and pressure.

Footnotes

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