

Three-Dimensional Modeling of an Inductive Oven for the ECR Ion Source

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The generation of intense beams of refractory metal ions for superheavy element research requires advanced heating systems in electron cyclotron resonance (ECR) ion sources. This work presents a three-dimensional multiphysics simulation of a high-temperature inductive oven designed for the DECRIS-PM ECR ion source at the Flerov Laboratory of Nuclear Reactions (JINR, Dubna). Using COMSOL Multiphysics, the model couples electromagnetic field calculations with thermal conduction and radiative heat transfer under vacuum conditions. The obtained results demonstrate that the developed 3D model provides a reliable basis for integration of inductive ovens into ECR ion sources and for further optimization.

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