The Role of Secondary Electrons in IEC and BT Fusion

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In Inertial Electrostatic Confinement (IEC) and Beam Target (BT) fusion systems secondary electrons are a product of beam-target and beam-beam interactions. these secondary electrons can then produce unwanted x-rays via bremsstrahlung with high Z components of the fusion reactor. To the best knowledge of the authors, no research has been conducted into the role of Secondary Electron Yield (SEY) in IEC and BT fusion systems, so a novel rectangular-grooved geometric secondary electron suppression system was conducted to test the effects of SEY on fusion rates. We hypothesized that an increase in the depth of the rectangular grooves would result in a lowered neutron rated and thus a lowered rate of D(d,n)3He fusion. On review of the data it was concluded that several possible confounding effects such as titanium deuteride decomposition on the suppressor resulted in an R squared of less than 0.12. This indicates that the null hypothesis, that the fusion rate was unaffected by SEY, could not be rejected. For future experiments, the authors recommend that either geometric suppression systems be actively cooled below 200 degrees Celsius, or an electrostatic suppression system be considered in place of a geometric system.

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