Studying the impurity charge dependence of impurity confinement in ECR-heated TJ-II stellarator plasmas

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The dependence of impurity confinement time has been studied as a function of charge and mass of the impurity ions by injecting by laser blow-off different types of impurity traces from LiF to W into electron cyclotron heated discharges of the TJ-II heliac. A distinct impurity confinement of injected ions is distinguished clearly in the plasma core as revealed from soft X-ray analysis and tomographic reconstruction of signals from a bolometer array. A dependence of impurity confinement with charge seems to be the most probable explanation, as confirmed by the analysis of spectrally resolved data in the VUV range. This is discussed in terms of the dependence of impurity neoclassical transport on the background radial electric field.