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The energy distribution of ions impinging on nanoparticles in collisional plasmas[1] FEDERICO GALLI, MEENAKSHI MANUNURU, UWE KORTSHAGEN, University of Minnesota — Plasmas are a versatile source for crystalline nanoparticles. The mechanism by which nanoparticles in a plasma crystallize is not yet fully understood. While selective nanoparticle heating through energetic surface reactions has been proposed as one mechanism, the effect of ions hitting the nanoparticle surface has not yet been explored. A self-consistent molecular dynamics simulation is used here to calculate the ion energy distribution (IED) function of ions impinging on the surface of nanoparticles in low-pressure argon plasmas. The computation includes the effects of resonant charge exchange and elastic collisions between ions and neutrals through a Monte Carlo null-collision method and considers both Maxwellian and non-Maxwellian electron energy distributions. Results show a strong dependence of the IED on pressure. Pressures of 1-10 Torr yield a remarkable reduction in the average ion energy and an enhancement in the ion flux to the surface of the nanoparticles.

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