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Plasmas in supercritical fluid with densely populated clusters[1]
GUNSU YUN, SEUNGTAEK LEE, JUHO LEE, SEOK-YONG JEONG, YOUNG-UK KIM, Pohang University of Science and Technology, JEONG-YOUNG JI, Utah State University, Logan — In supercritical fluid (SCF) with dense population of stable clusters ($\sim$ 1000 mm^{-3}; mean size $\sim$ 200 nm)[a], elongated plasmas are produced along the optical axis of laser pulse (532 nm, 6 ns, 400 mJ, peak intensity $\sim$ 1 TW/cm^2). The plasma has a strong afterglow with the lifetime up to 1 μs, increasing with the number density of clusters. For argon SCF plasmas, the electron temperature and density estimated from continuum emission spectra are $\sim$ 1 eV and $\sim 10^{21}$cm^{-3}, respectively, corresponding to a high Coulomb coupling constant of the order of unity. The radial diffusion is weak, smaller than the diffusion length predicted by the one-component plasma theory for moderate to strong Coulomb coupling[b]. These observations suggest that the presence of clusters strongly affects the particle and energy transport processes. [a]S.T. Lee et al., APS Gaseous Electronics Conf.(2019). [b]Daligault, Phys. Rev. Lett. 108 (2012).

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