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Microplasmas: Challenges and Opportunities — •Achim von Keudell — Ruhr-Universität Bochum

Microplasmas have gained significant interest in recent years. Although operated at atmospheric pressures, microplasmas have pronounced non-equilibrium characteristics, i.e. they possess energetic electrons while ions and neutrals remain cold. This is largely due to their confinement into narrow spaces - the discharge vessels have dimensions in the range of a few 10 to a few 100 micrometers. High operation pressures make elaborate vacuum systems obsolete and very high densities of electrons and reactive species are achievable. Non-equilibrium microplasmas have a multitude of possible applications ranging from new light sources to the option of strictly localized modification or functionalization of sensitive surfaces such as biological matter, for example. The fundamental understanding of these plasmas is still incomplete due to the inherently extreme boundary conditions these plasmas present for diagnostics and modeling. New cutting edge diagnostics have to be developed and existing techniques have to be modified to achieve extreme space and time resolution. New diagnostic concepts ranging from laser absorption techniques to modulated beam mass spectrometry are introduced and recent results on micro-hollow cathode plasmas, microstructure arrays and plasma jets are presented.