Plasma Electrochemistry: A Novel Chemical Synthetic Route

이승환†
국가핵융합연구소
(leesw@nfri.re.kr†)

Recently, plasmas formed at sub-millimeter spatial scales, microplasmas, operate stably and close to non-thermally at atmospheric pressure and are a source of ions, electrons, and other electronically excited states at ambient conditions. These features make microplasmas suitable for novel electrochemical applications where gas-phase species (e.g. electrons) in the plasma can directly initiate redox reactions.
Here, I will present several examples of plasma electrochemical reactions for nanomaterial synthesis and patterning. Metal cations in solution such as Ag+ are electrochemically reduced by the plasma to solid metal, resulting in the formation of metal nanoparticles without any chemical reducing agent. Alternatively, thin films of metal cations dispersed on a polymer are electrochemically reduced by a rastered microplasma. T To further reduce the size of the patterned structures, I have explored masking techniques and self-assembly based on metallopolymer. Details of these various approaches will be discussed in detail, including materials characterization and potential applications.