Plasma processing of nano and microparticles in Gliding Arc Tornado device

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The Gliding Arc Tornado (GAT) is a device operating a near atmospheric pressure discharge with optimized hydrodynamical properties compared to those of gliding arcs reactors. The name points to the reverse vortex flow configuration, a tornado, of the gas-phase in the discharge region. In practice, this is implemented through a tangential gas injection from the lateral surface of a cylinder hosting the process chamber. This ensures an optimal mixing and much longer residence times respect to an axial laminar flow [1]. It provides also, normally a better insulation of the device walls from the discharge. It was also observed that a higher level of non-equilibrium characterizes the plasma gas-phase than in arcs. We have developed and used a kind of these devices for the treatment of lignin by plasmas [2]. Particles in powder, such as lignin, can be easily injected in the gas flow, separated and exposed to the plasma gas-phase while they are transported by the hydrodynamical flow. So optimal interaction with the discharge gas-phase could be achieved. Here we will present some results concerning the characterization of the discharge and of the plasma gas-phase. We discuss briefly also the prospect of plasma processing and its optimization, we have studied during a dedicated application, the POLISTE project [3].

References

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