Optical investigations of dust particles in a DC glow discharge

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The growth of nanoparticles from the sputtering of a tungsten cathode in DC argon glow discharges is reported. The study was performed at fixed argon pressure and constant discharge current. In previous investigations \cite{1}, the growth by successive agglomerations was evidenced: first, tungsten nanocrystallites agglomerate into primary particles, the most probable size of which being \(\sim 30\) nm. Primary particles of this size were observed for all plasma durations and always remained the most numerous in the discharge. Primary particles quickly agglomerated to form particles with size up to \(\sim 150\) nm.

![Graph of light extinction measurement](image)

Figure 1: Light extinction measurement of the volume mean diameter of dust particles as a function of time \((P = 60\) Pa and \(I = 40\) mA).

In this poster, the spatial distribution of dust particle is studied by optical extinction and by video recording of the scattered light of a vertical laser sheet passing through the discharge gap. It is found that the dust particles are segregated in size. Video images shows that the dust cloud has a complex structure near the cathode.

References

\cite{1} Kishor Kumar K., L. Couëdel and, C. Arnas, Phys. Plasmas 20, 043707 (2013)