# Plasma imaging and spectroscopic studies from laser-assisted vacuum-arc source

G. A. Beyene[a], I. Tobin[b], L. Juschkin[c], Gerry O'Sullivan[a], and Fergal O'Reilly[a]

[a]School of Physics, University College Dublin, Dublin, Ireland

[b]School of Physics, Trinity College Dublin, Dublin, Ireland

[c]Department of Physics, RWTH Aachen University, Aachen, Germany

Laser and discharge produced plasmas are the most extensively studied candidates to produce Extreme Ultraviolet (EUV) light that has to meet strict requirements of high power & brightness among others for applications in micro-lithography for next generation chip production. The hybrid laser-assisted vacuum-arc discharge sources combine the scalability and stability features besides high energy conversion efficiency (CE) of the input energy which has been demonstrated in this report.

Time resolved visible imaging and EUV spectroscopy combined with temporal profiles were used to diagnose the EUV photons from laser triggered discharge plasma formed from liquid Sn coated on rotating-wheel-electrodes. The EUV output was found to correlate with the localized ablation of the thin film. This was studied by tailoring laser parameters, mainly the pulse duration and energy density, using two Nd:YAG lasers of ~170ps and ~7ns, each 1064nm, with energy range of ~1-100 mJ. The picosecond (ps)-laser showed an increase in CE and spectral purity compared to ns-triggering. The difference is mainly due to the expanding plasma dynamics.