

# ATMOSPHERIC PRESSURE INDUCTIVELY COUPLED PLASMA FOR SiC MIRRORS PRECISION MACHINING

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## Abstract

The next generation of 30-100 metre diameter extremely large telescopes (ELTs) requires large numbers of hexagonal primary mirror segments ~4000 for ESO's 100 m 'Overwhelmingly Large Telescope' (OWL), and ~700 for the alternative European concept – the 'Euro50' 50 metre telescope. As part of the Basic Technology programme run jointly by UCL and Cranfield University, a reactive atomic plasma technology (RAPT<sup>®</sup>) which emerged from the US National Ignition Facility project at the Lawrence Livermore National Laboratory (LLNL), is being developed and will be employed at Cranfield [2] for the finishing of these surfaces.

An inductively coupled plasma (ICP) at atmospheric pressure in argon excites a reactive gas injected through the centre of the plasma. The plume of hot neutral excited species, of predictable and reproducible shape, acts like a stable, pseudo-gaussian sub-aperture tool. Reaction with the substrate results in controlled material removal over a large area. RAPT Inc. has shown a large dynamic range in material removal-rate (>7 orders of magnitude). As a non-contact process, this wide removal range makes the process suitable for the removal of sub-surface damage as caused by earlier processing stages of optical fabrication (grinding for example). The first results obtained on planar SiC samples are presented.