

Growth of Ultrananocrystalline Diamond films via DC
Arcjet CVD
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Recently the growth of Ultrananocrystalline diamond (UNCD) films has attracted much interest due both to its potential use as an ultrahard thin coating and its field emission properties. While the growth of UNCD films onto silicon has been studied by microwave-enhanced CVD methods, little is known about the deposition from a DC-arcjet CVD reactor.

We now report on the growth of UNCD using a 10 kW DC-arcjet reactor from Ar/H₂/CH₄ gas mixtures. This produces freestanding UNCD thin films at growth rates greatly surpassing that achieved in microwave systems.

Here we shall report on the characterisation, crystallinity and the electronic properties of these films. We shall also present a detailed study of the gas-phase chemistry occurring in the reactive discharge region during film growth as measured by cavity ringdown spectroscopy, including spatially-resolved quantitative measurements of C₂ concentrations.