Ignition of microplasma arrays in diamond devices

S Mitea, D C Barthaud, J Kowal, N St J Braithwaite and M D Bowden
The Open University, Milton Keynes, MK7 6AA

s.mitea@open.ac.uk

Microdischarge-related research and microdischarge applications have both soared in the past few years. While the development of microdischarges has involved a wide range of diagnostic techniques, sizes and materials, most studies have concentrated on specific applications or operation in specific modes, and understanding of fundamental issues such as ignition and instabilities is still limited. In this project we aim to investigate fundamental properties of microhollow cathode devices fabricated in diamond.

Diamond has many potential advantages as a substrate material for microhollow cathode discharges. Furthermore, its properties can be increasingly well-controlled by fabrication techniques that have been developed in recent years. The unique properties of diamond and progress in Chemical Vapour Deposition techniques open the door to novel applications and experimental investigations [1].

We report on the first results of operation of diamond-based microplasmas. The devices are operated at atmospheric pressure in a controlled environment of helium, and characterised by electrical and optical measurements. In this paper, current-voltage characteristics and optical emission spectroscopy are presented for different microcavity architectures. We also report on the operation of arrays of microhollow cathode discharges fabricated in diamond.

This work is a collaboration between the University of Bristol, the Rutherford Appleton Laboratory and The Open University, and supported by the UK Engineering and Physical Science Research Council.

References

1. P. W. May. The new diamond age? Science, 319(5869):1490–1491, March 2008.

[POSTER PRESENTATION]