Laser written components in diamond for sensor applications

Direct laser writing with ultrashort pulses has strong potential as a disruptive innovation for diamond technology. The technique brings the ability to fabricate structures in three dimensions inside diamond, surpassing constraints from previous planar architectures. Using different processing regimes, a range of different components are possible for electrical, optical and quantum applications. The research proposed has potential for both industrial and academic impact.

The aims and objectives are:

1. To understand the physical basis for laser induced breakdown of the diamond, and how this may be tailored to optimise the performance of laser written components. This will include consideration of the light-matter interaction within the diamond and also subsequent breakdown mechanisms once a focal plasma has been established.

2. The development of a set of processing conditions for laser written structures with optimum performance in electrical, optical and quantum applications.

3. To utilise the developed knowledge to laser fabricate advanced sensor devices inside diamond.

This project is run in partnership with Opsydia, a spin out company established to commercialise the technology. The studentship provides funding for 4 years starting with a one year Masters course in Diamond Technology at Warwick University, including two mini-projects at partners that are closely linked to the PhD project, prior to starting the PhD/DPhil at Oxford University.

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