**Hybrid nanodiamond materials: the present and future**

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Light-based imaging and sensing tools can assist with our understanding of the complex chemical and molecular processes taking place in and around cells in the living body [1]. Fluorescent nanodiamonds (NDs) are an attractive nanoscale-tool that have a range of unique properties which make them highly desirable for a range of applications including bioimaging and biosensing applications [2]. Their fluorescence is produced via optical excitation of atomic defects, such as the negatively charged nitrogen vacancy centre, within the diamond crystal lattice. Possessing long-wavelength emission, high brightness, no photobleaching, no photoblinking, nanometer size, a room temperature sensitivity to magnetic and microwave fields, and an exceptional resistance to chemical degradation make NDs almost the ideal fluorescent bioimaging nanoprobe [3].

I will discuss these exciting properties in detail and give some examples of the effect of surface functionality on their fluorescent properties [4], their use as fluorescent probes for pH [5] and hydrogen peroxide sensing in biological systems [6], and the effect of particle size on nanodiamond fluorescence and colloidal properties in biological media [7]. In addition, I will also discuss hybrid biosensing applications including the incorporation of NDs into polycaprolactone [8] and silk. Furthermore, I will also examine some future directions of hybrid nanodiamond materials including optical fibres that are intrinsically sensitive to magnetic fields [9], which contrast with conventional telecommunication-grade fibres.

Figure 1. Confocal fluorescence map from the side of a diamond-doped tellurite glass optical fibre [9].

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