Nanodiamonds and adaptive optics for deep tissue super-resolution microscopy

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Diamond presents much promise for biological applications, its stability means it is biocompatible and does not photobleach, unlike most dyes. Nanoscale sized particles of diamond have been shown to be small enough to allow endocytosis. Furthermore, the presence of optically active defects in the diamond structure, such as the nitrogen-vacancy (NV) defect, allow optical addressing of individual nanodiamonds. There is much interest in using the NV centre as a nanoscale sensor for biologically generated electromagnetic fields. We are developing a superresolution microscope to allow the characterisation of the optical properties of nanodiamond in living tissue, such as the sensitivity of the optically active defects to small electromagnetic fields. We will also explore the more general use of diamond as an in-vivo fluorescent marker.

Keywords: deep tissue imaging; nanodiamonds; optics

Accepted manuscript of the following research output: Johnstone, G. (2018). *Nanodiamonds and adaptive optics for deep tissue super-resolution microscopy*. Poster session presented at RMS Frontiers in Bioimaging 2018, Glasgow, United Kingdom.