John F Donegan, J Nanomed Nanotechnol 2014, 5:5
http://dx.doi.org/10.4172/2157-7439.S1.017

OMICS Group Conferences
Accelerating Scientific Discovery

4th International Conference on
Nanotek & Expo

December 01-03, 2014 DoubleTree by Hilton Hotel San Francisco Airport, USA

Helium ion microscope generated nitrogen-vacancy centres in type Ib diamond

John F Donegan
CRANN research institute, Ireland

The nitrogen-vacancy centre (NV) in diamond is a well-studied, optically active colour centre formed by a substitutional nitrogen atom and a nearest-neighbour lattice vacancy. These centres are naturally present in low concentration in diamond containing nitrogen and have received considerable attention recently for their spin properties, room temperature photostability, potential to create single photon sources, use in biological sensing, and as tools for nanoscopy and magnetometry. For many of these applications, precise position and density control of colour centres is essential. We report on position and density control of nitrogen-vacancy (NV) centres created in type Ib diamond using localised exposure from a helium ion microscope and subsequent annealing. Spatial control to <380 nm has been achieved. We show that the fluorescence lifetime of the created centres decreases with increasing ion dose. Furthermore, we show that for doses >1x1017 ion/cm^2, significant damage of the diamond lattice occurs resulting in fluorescence quenching and amorphization. This places an upper limit on the density of NV centres that can be created using this method.

Biography

John F Donegan completed his PhD in 1986 from University College Galway in Ireland. He had Post-doctoral periods in Lehigh University and in the Max Planck Institute fur Festkoerperforschung, Stuttgart, Germany. He has been a Professor of Physics in Trinity College Dublin since 1993. He is the Deputy Director of CRANN, the leading nanoscience institute in Ireland, based in CRANN. He leads the Photonics group working on plasmonic and waveguide structures including diode lasers and whispering gallery mode systems. He has published more than 170 papers.

JDONEGAN@tcd.ie