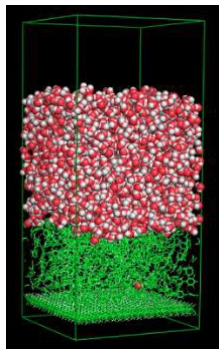


Understanding the Effect of Organic Coatings on NV-Diamond Quantum Sensors at an Atomic Level

Institution	The University of Queensland
Project details	Nitrogen-vacancy (NV) centres within layers of nano-diamond lie at the heart of many quantum sensing devices. NV centres are exquisitely sensitivity to changes in magnetic and electric fields. To be effective quantum sensors NV centres must be in a uniform environment, insulated from the effects at the surface of the diamond. While the precise location of NV centres in the diamond lattice is difficult to control during manufacture it has recently been shown that applying a thin film of certain organic materials to the diamond surface improves uniformity and the performance of the NV centres significantly. The mechanical and opto-electronic properties of organic films depend critically on their structure and morphology at an atomic level. The aim of this project is to use computer simulation techniques to determine how different organic materials assemble at the diamond surface and how the morphology of the organic layer affects the way NV centres interact with the local environment such as a layer of water (see figure). The simulation studies will use tools previously developed to investigate organic semiconductor materials and will be performed in parallel with experimental studies being undertaken within the group of Prof David Simpson at the University of Melbourne. You will assist by performing computer simulations of the vacuum deposition of different materials onto diamond substrates to determine how the morphology of the coating layer effects the efficiency of the quantum device for comparison to existing experimental data. 
Who can apply	Students with a background in physics, physical chemistry, computational science. While not required some experience with linux as well as python or another programming or scripting language would be a significant advantage.
Contact / Project supervisors	Prof Alan E Mark - a.e.mark@uq.edu.au Dr Martin Stroet - m.stroet@uq.edu.au