



Optics and Photonics Seminar

Wednesday, July 5, 2023, 11:00 am

IRIS – R. 2.049 (Foyer), Zum Großen Windkanal 2, 12489 Berlin

Prof. Steven Praver

University of Melbourne and Carbon Cybernetics, Australia

Optimizing the termination of diamond surfaces for sensing applications

The scientific literature is awash with suggestions as to how to best terminate diamond surfaces for optimal performance in sensing applications using near surface NV centres. Often the surface science techniques used to characterize the diamond surfaces (eg XPS) are not sufficiently sensitive to be able to be used to optimize the surface treatment. In this talk, I will describe the use of simple electrochemical techniques that can be used to gain fine control of the diamond surface. Using electrochemistry, one can readily detect the differences between different techniques used for oxygen termination, such as plasma, acid boiling, oxygen annealing and ozone treatments, whereas these surfaces all appear to be very similar when examined using XPS. Applications include the use of diamond to sense and stimulate neuronal activity.



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Wednesday, July 5, 2023, 3:00 pm

Institut für Physik – Gerthsen-Hörsaal, Newtonstr. 15, 12489 Berlin

Prof. Steven Praver

University of Melbourne and Carbon Cybernetics, Australia

Improving the quality of life for patients with drug resistant epilepsy

Epilepsy affects about 1% of the world's population and in 30% of cases drugs are not able to control the seizures. The uncertainty of when a seizure may occur is one of the major burdens of the disease, limiting everyday activities such as driving, swimming, and child care. Brain excitability has been shown to be strong predictor of seizure risk, but accurately measuring brain excitability requires arrays of electrodes capable of recording signals from single neurons, and integration of these electrodes into miniature packages that provide continuous, high fidelity recordings for the lifetime of the patient. In this talk I will describe our work to fabricate such miniature, minimally invasive brain machine interfaces based on carbon and diamond technologies. Using such devices to optimize electrical and other therapies offers hope for a seizure free future for those suffering from drug resistant epilepsy.