

Method for in-solution, high-throughput T_1 relaxometry using fluorescent nanodiamonds

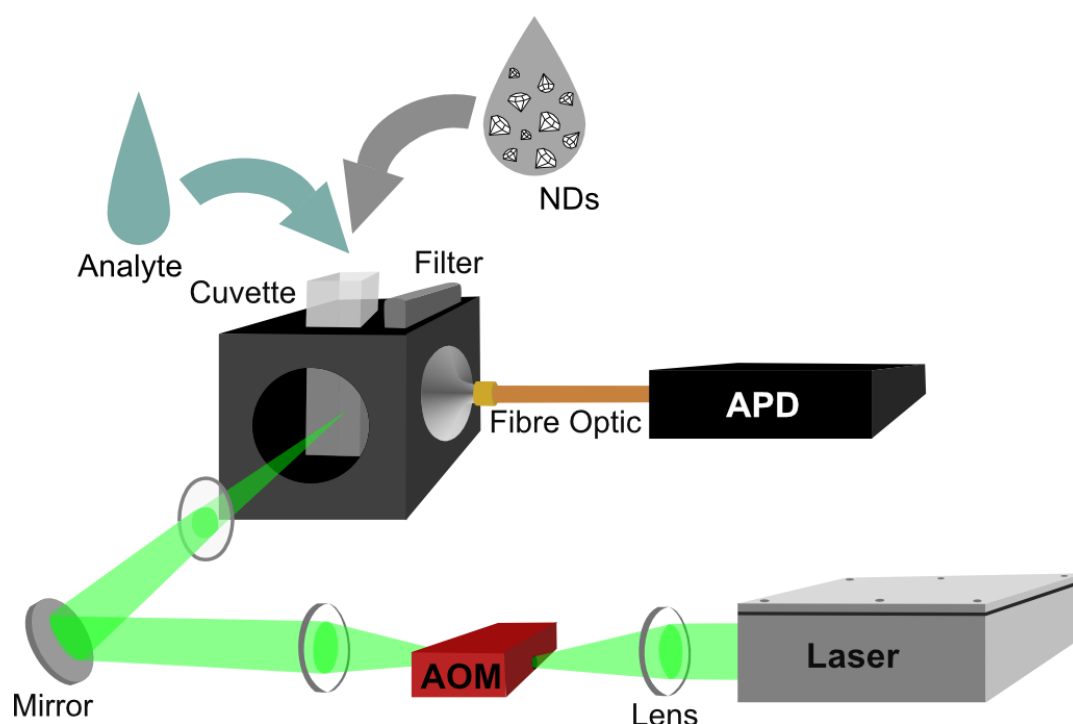
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Fluorescent nanodiamonds (FNDs) have been exploited as sensitive quantum probes for nanoscale chemical and biological sensing applications, with the majority of demonstrations to date relying on the detection of single FNDs. This places significant limits on the measurement time, throughput, and the statistical significance of a measured result as there is usually marked inhomogeneity within FND samples. Here we have developed a measurement platform that can report the T_1 spin lattice relaxation time from a large ensemble of FNDs in solution. This platform can be used for rapid material characterisation and chemical sensing in a convenient cuvette-based approach. We describe a refined sensing protocol for this modality and use it to identify the optimal FND size for detection of paramagnetic species. Our approach is simple to set up, robust and can be applied to explore the effects of surface functionalisation on the coherence properties of FNDs as well as a whole host of *in-situ* chemical sensing opportunities.