

Organic nanodiamonds

Philip Hemmer and Todd Zapata

Texas A&M University, 3128 TAMU, College Station, USA

I discuss recent progress on the growth of nanodiamonds in the presence of stable diamond-like organic seed molecules. Briefly the goal is to grow diamonds around specially designed seed molecules that have the dopant atoms needed for specific color centers. It can be seen that this approach can give unprecedented control over the number and placement of color centers. Complete, scalable, quantum registers might also be fabricated by this technique, for example a nitrogen-vacancy and a ^{13}C atom with a well-defined separation surrounded by only ^{12}C diamond. Other benefits to this approach include near-deterministic number and placement of color centers, so that nanodiamonds no matter how small can be designed to have at least one bright and photostable fluorescent emitter. Given the low-toxicity of diamond and the demonstrated small size (1.6 nm) for photostable fluorescent nanodiamonds this could lead to new generation of non-bleaching fluorescent bio-markers that are smaller than many existing dye molecules.