

Molecular nanodiamonds

Initiative: Integration molekularer Komponenten in funktionale makroskopische Systeme (beendet, nur noch Fortsetzungsanträge)

Bewilligung: 06.08.2017

Laufzeit: 3 Jahre

Projekt-Website: www.quantenoptik.de

Nano-crystalline diamond is a new carbon phase with numerous intriguing physical and chemical properties and applications. Small doped nanodiamonds for example do find increased use as novel quantum markers and sensors in biomedical applications. However, making nanodiamonds below sizes of 5 nm with controlled composition has been elusive so far. The aim of this project is engineered growth of functional nanodiamonds with unprecedented degree of control of size, doping, isotopic composition and surface termination. The approach should allow to incorporate a custom designed seed molecule at the center of a nanodiamond. By substituting atoms at particular locations in the seed molecule it will be possible to achieve complex multi-atom diamond color centers or even to engineer complete nitrogen-vacancy (NV) quantum registers with auxiliary nuclear spins. Furthermore, quantum confinement effects in undoped ultrasmall material (with sizes between 2 and 5 nm) will be explored to design states in the bandgap which yield fluorescence and spin properties similar to that of color centers without placing a heteroatom. Finally, new diamond material for applications in quantum computing, quantum sensing and photochemistry will be explored.

Projektbeteiligte

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