Phospholipid coatings of fluorescent nanodiamonds

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Nanodiamonds (NDs) are being thoroughly studied as a promising non-toxic material for fluorescent imaging. The combination of physical and chemical properties of diamond and its size in the range of tens of nanometers make these particles a viable option for such applications. In contrast to fluorescent proteins and other organic fluorescent dyes, which suffer from photobleaching, NDs are extremely photoresistant and well suited to be used for long-term imaging in vitro. Although the bare nanodiamonds are chemically inert, they suffer from aggregation in biological environment. Here, we addressed this issue by deposition of self-assembled phospholipid bilayers on NDs. Silica was proven to be an ideal substrate for assembly of supported lipid bilayers. We therefore developed a method to grow silica shells of controlled thickness on the surface of NDs. The formation of supported phospholipid bilayers on silica-coated NDs was confirmed using cryoTEM and fluorescent assay and their increased colloidal stability tested in series of buffer solutions. We will present these composite nanoparticles as new platforms for construction of optical nanosensors based on self-assembly in solution.