**Development of silk** **fibroin coated nanodiamonds for drug delivery and theranostic applications**

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Advanced nanoparticle-based delivery systems or nanocarriers are great tools for delivery of therapeutic agents to the desired sites. They offer great advantages over conventional dosage forms such as increased dosing, targeted and simultaneous delivery. Extensive research work is being undertaken to find best nanocarriers for loading hydrophobic drugs and being biocompatible and biodegradable are important selection criteria [1]. Among various biomaterials, natural polymer structures such as silk fibroin meet these criteria well and can help to ensure controlled drug release via slow diffusion [2]. Tracking and imaging the biodistribution of delivery systems is a valuable tool for characterizing the efficiency of targeted release. Traditionally, it can be done using organic dye molecules to label non-fluorescent nanocarriers. However, they suffer from photobleaching which hinders long-term bioimaging and tracking. One strategy to overcome this problem is to embed photostable fluorescent nanoparticles in the nanocarriers. Photostable and highly bright nanodiamonds (NDs) are an excellent candidate for tracking delivery systems over extended times [3].

Here, we report on using silk fibroin coated nanodiamonds containing chemotherapy drugs for targeting brain cancer cells derived by glioblastoma which is the most aggressive and common malignant type of brain cancer. A method has been developed to surround silk coated nanodiamonds in Aleuria aurantia lectin proteins that bind fucose with high specificity and assess their ability to efficiently recognize and release drugs into human glioblastoma derived astrocytes cells. Extensive biophysical characterization on the newly developed particles such as dynamic light scattering, Fourier-transform infrared spectroscopy (FT-IR) as well as scanning and transmission electron microscopy have been conducted to evaluate successful bio-conjugation of the selected protein to our nanocarriers. This delivery strategy prolongs chemotherapy drug delivery rate and helps to reduce drug resistance and efflux barriers, which could be extrapolated to determining potential treatment efficacy.

**References.**

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