Tunable coloration of diamond films by encapsulation of plasmonic Ag nanoparticles

Objective

To grow CVD diamond films in order to encapsulate Ag nanoparticles, check if they were successfully made.

Sample preparation

First, deposit CVD diamond film 30 nm thickness over silicon oxide substrate, then "embedding Ag nanoparticles into the diamond film. Microwave plasma heating of Ag thin films deposited onto H-terminated diamond films grown on transparent fused quartz substrates leads to de-wetting and formation of a high density, two-dimensional array of size controlled Ag nanoparticles." Finally, it was coated with another diamond film with similar thickness as the previous one.

Data acquisition conditions

"Scanning electron microscopy (SEM) and Energy-Dispersive X-Ray Spectroscopy (EDS) measurements were carried out using a Leo Gemini Supra 55 VP field-emission scanning electron microscope. To best capture the film morphology, an SE2 detector was used for imaging. Energy dispersive X-ray spectra were obtained on this same instrument using a ThermoFisher UltraDry Compact EDS detector."

Representative figure /results

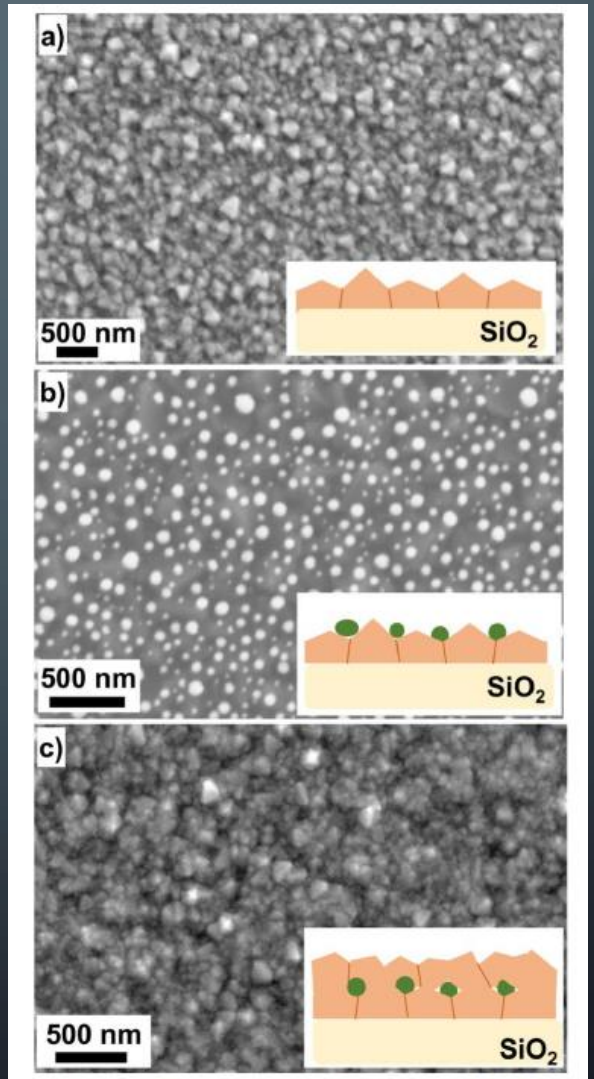

Fig. 1. Top-view SEM images and schematic illustrations (insets) of a) diamond grown on SiO_2; b) dewetted Ag nanoparticles on diamond/SiO_2; and c) film of Ag nanoparticles fully encapsulated by diamond.

":The combination of EDS and XPS shows that Ag is present within the diamond film but is not present on the top surface."

Reference

S. Li, J. Bandy, and R. J. Hamers, 'Tunable coloration of diamond films by encapsulation of plasmonic ag nanoparticles", Diamond and Related Materials, vol. 89, pp. 190-196, 2018, issn:0925-9635.doi: https://doi.org/10.1016/j.diamond.2018.09.003.[Online].Available:http://www.sciencedirect.com/science/article/pii/S0925963518302826.