

Influence of Annealing on nano-Palladium Films with Diamond-Like Carbon Buffer Layer

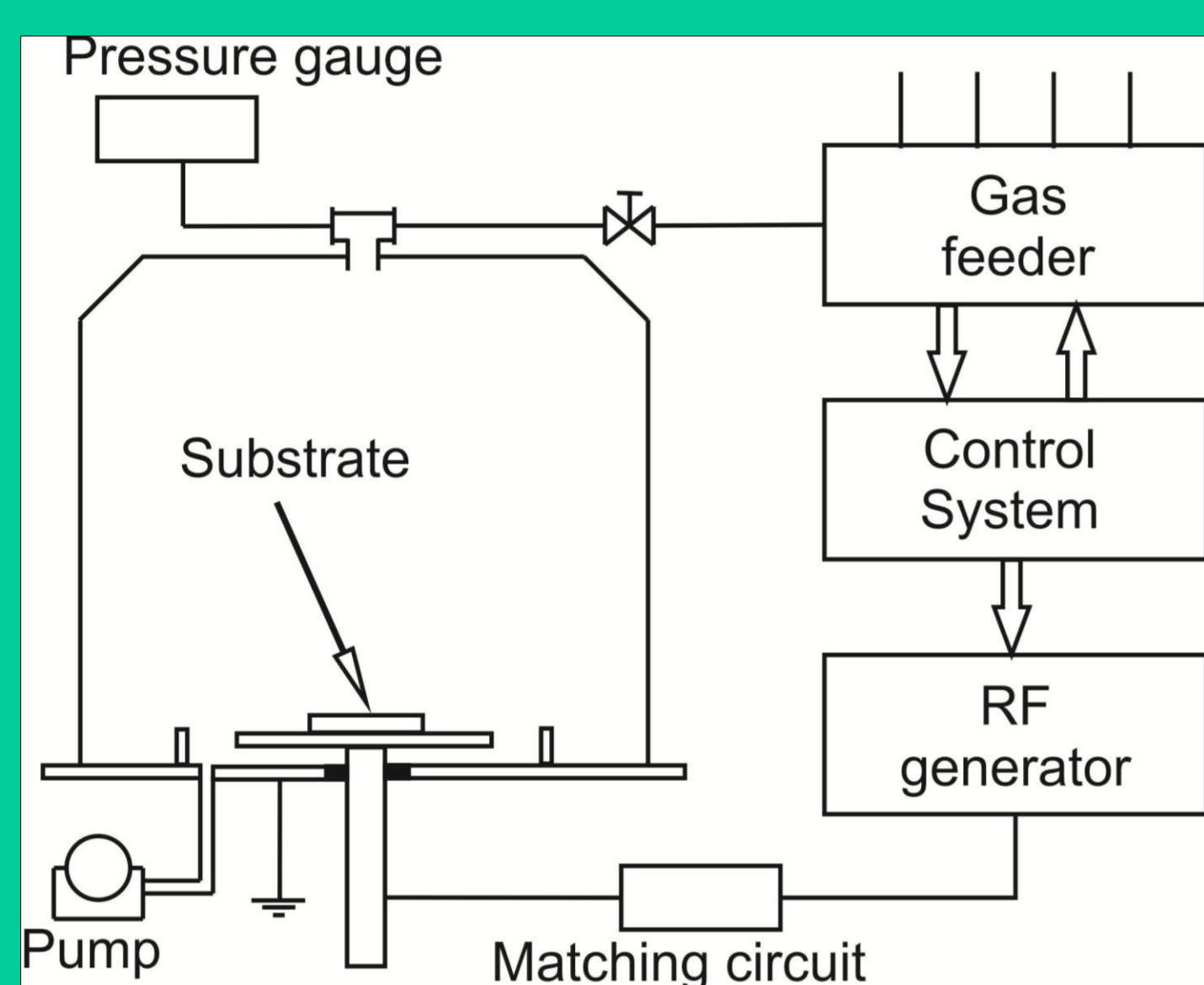
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Palladium crystals included in thin layers can be applied in hydrogen and hydrogen compounds sensors. The size of palladium grains and their distribution on the film surface are very important parameters from the point of view sensitivity of such film and their ability of hydrogen dissolution in palladium. First physical vapor deposition (PVD) process was used to obtain silicon substrate with palladium nanocrystals dispersed in all the volume of film then diamond-like carbon (DLC) film was deposited by radio frequency plasma assisted chemical vapor deposition method (RF PACVD) at last layers annealed in temperature 650°C and 700°C.

The influence of annealing DLC/n-Pd system on morphology and nano-palladium content



Schematic diagram of RF PACVD setup.

Parameters of DLC deposition processes

Sample	Self-bias voltage[V]	Time [s]	Methane flow[ml/min]	Temperature of annealing [°C]	Thickness [nm]
125a	280	15	20	650	11,6
125b	280	30	700	18,4	

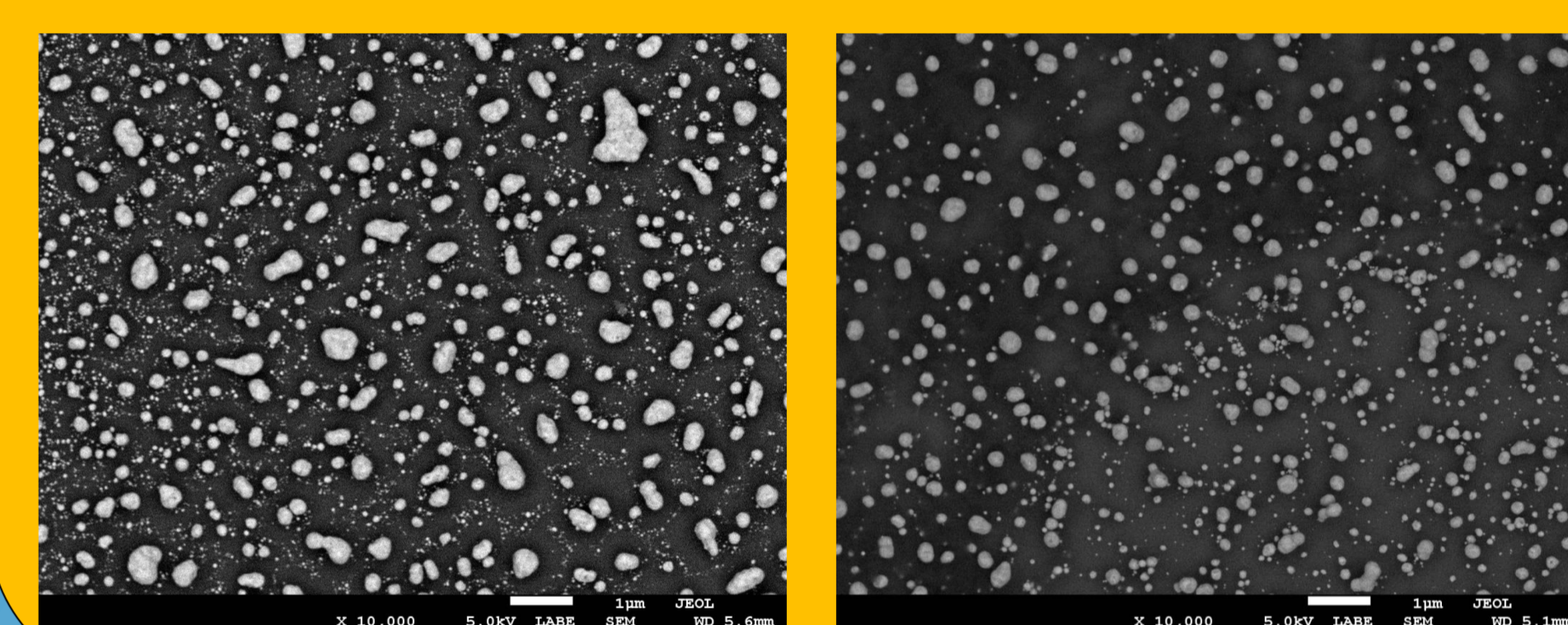
PVD/CVD nC- Pd FILM
DLC LAYER
SUBSTRATE

Structure of hydrogen sensor

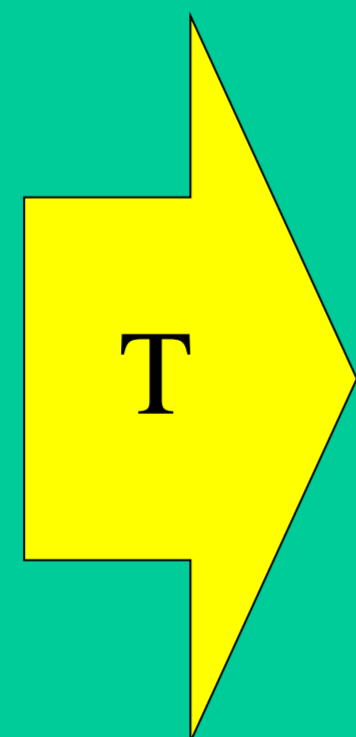
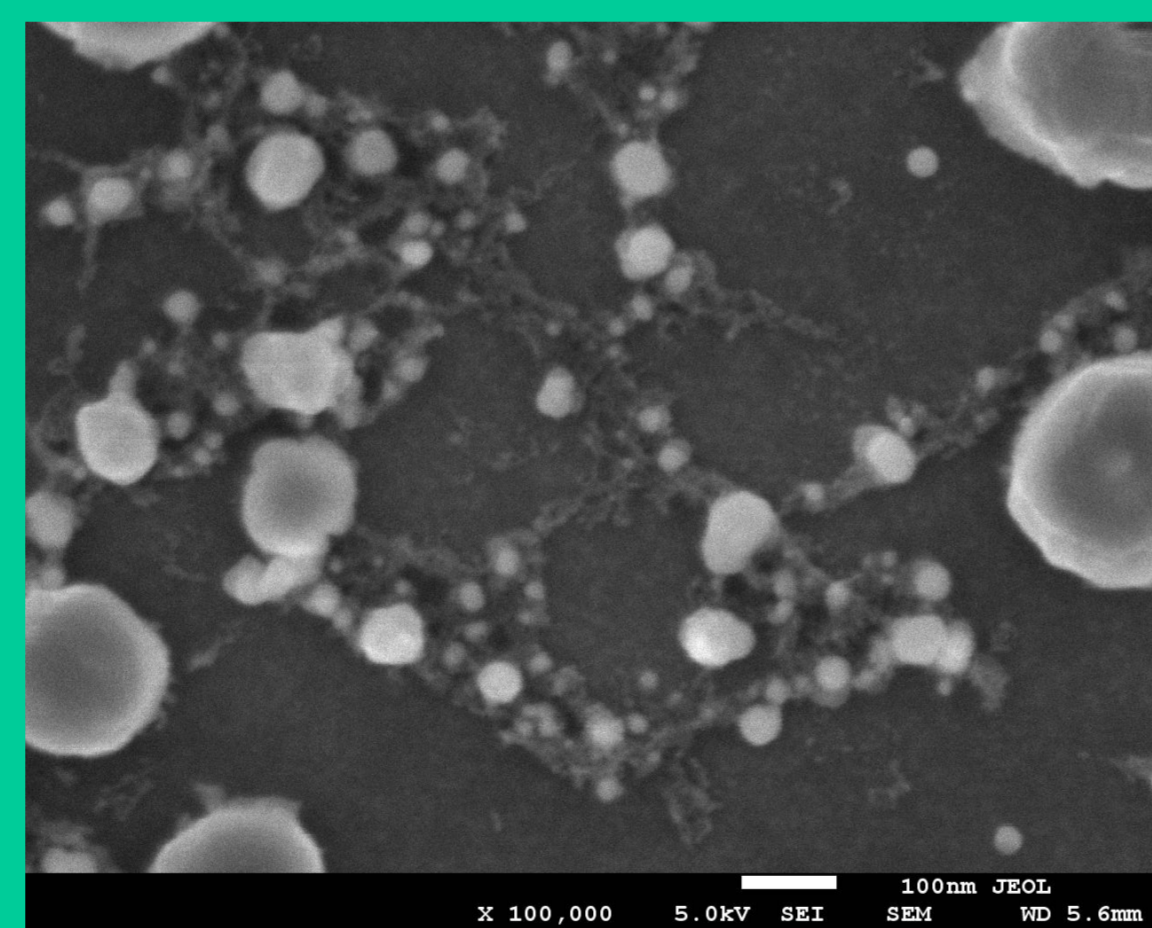
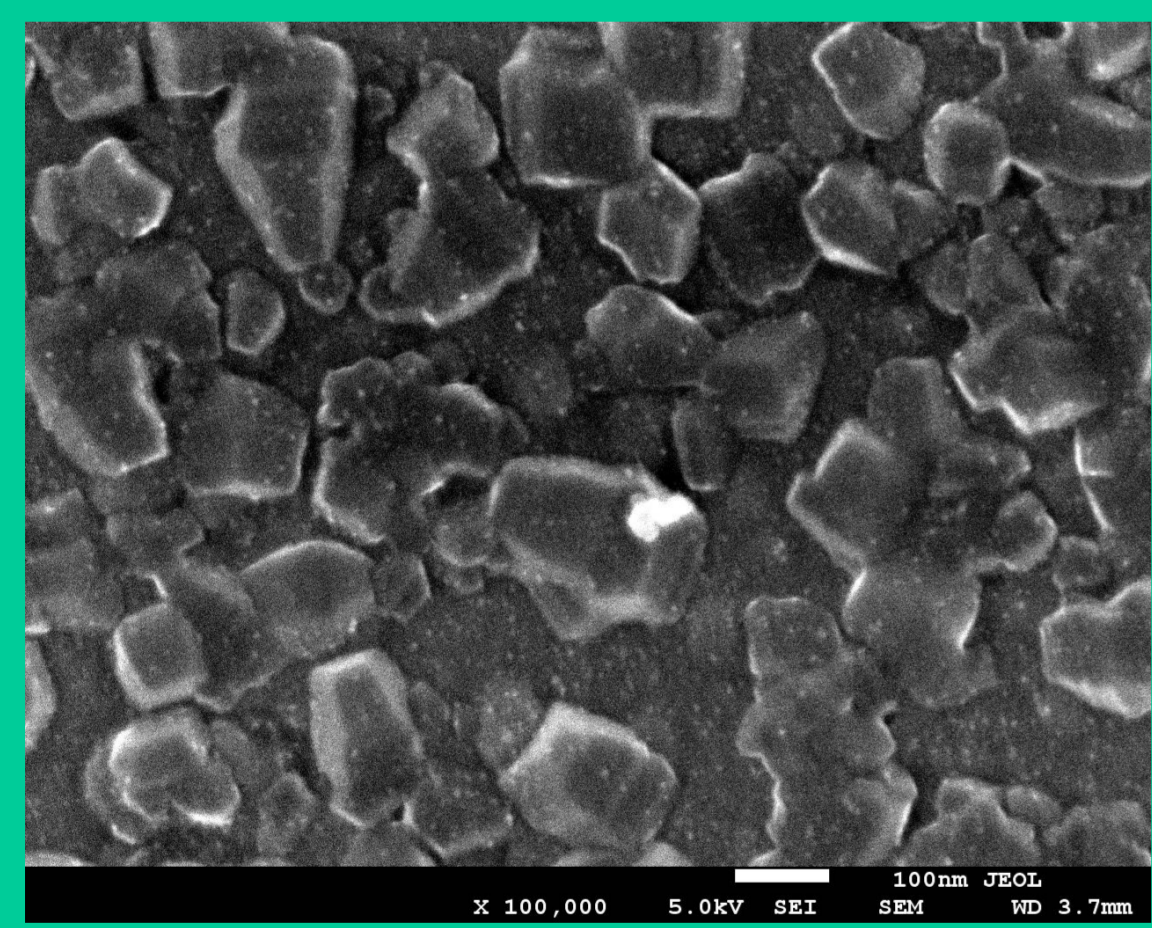
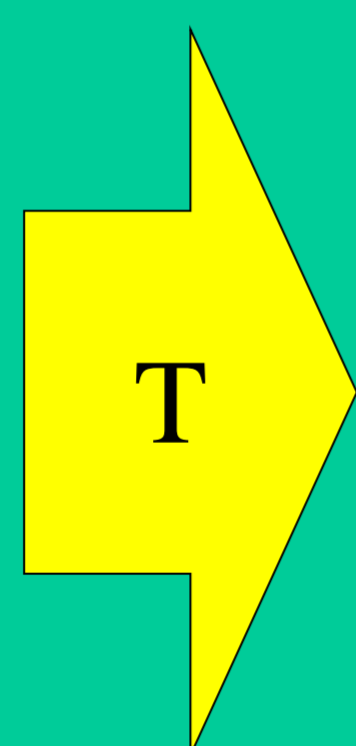
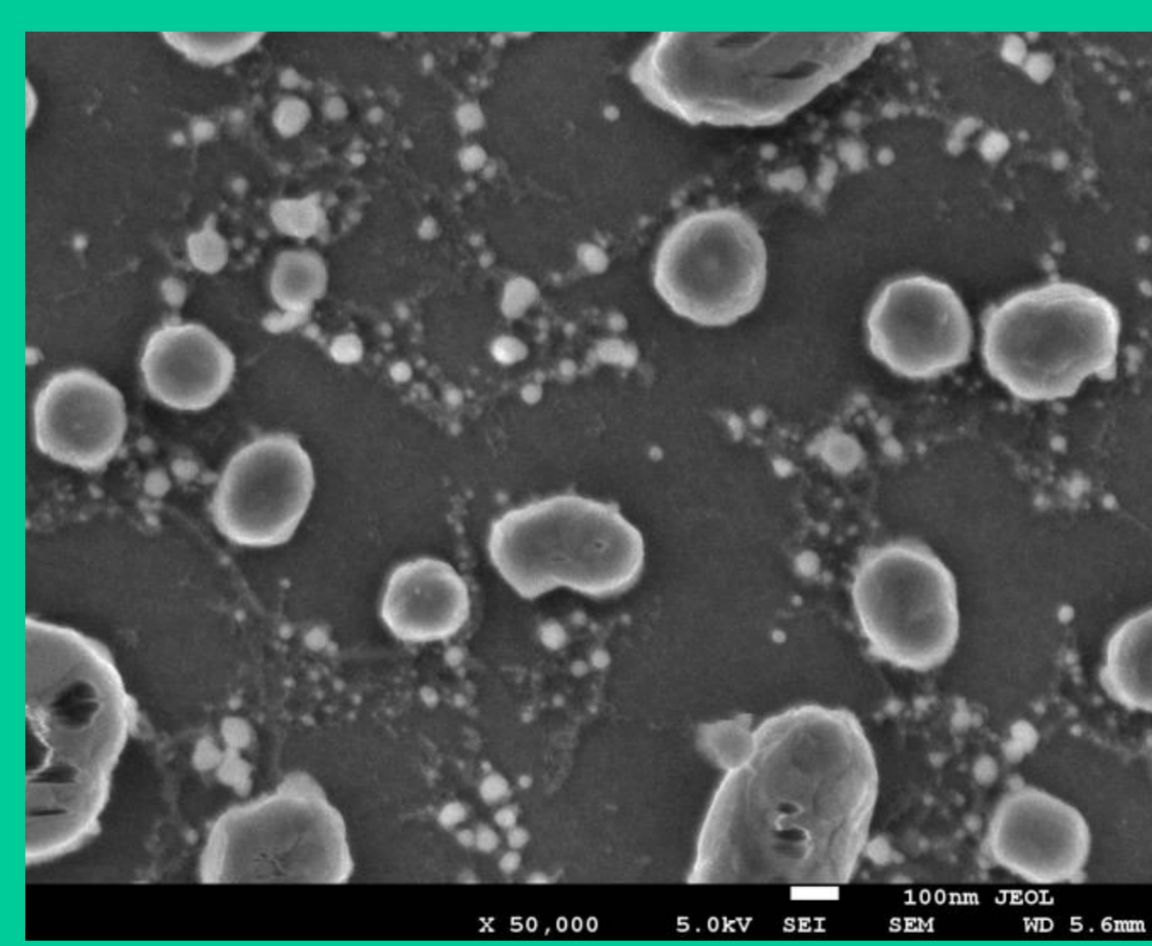
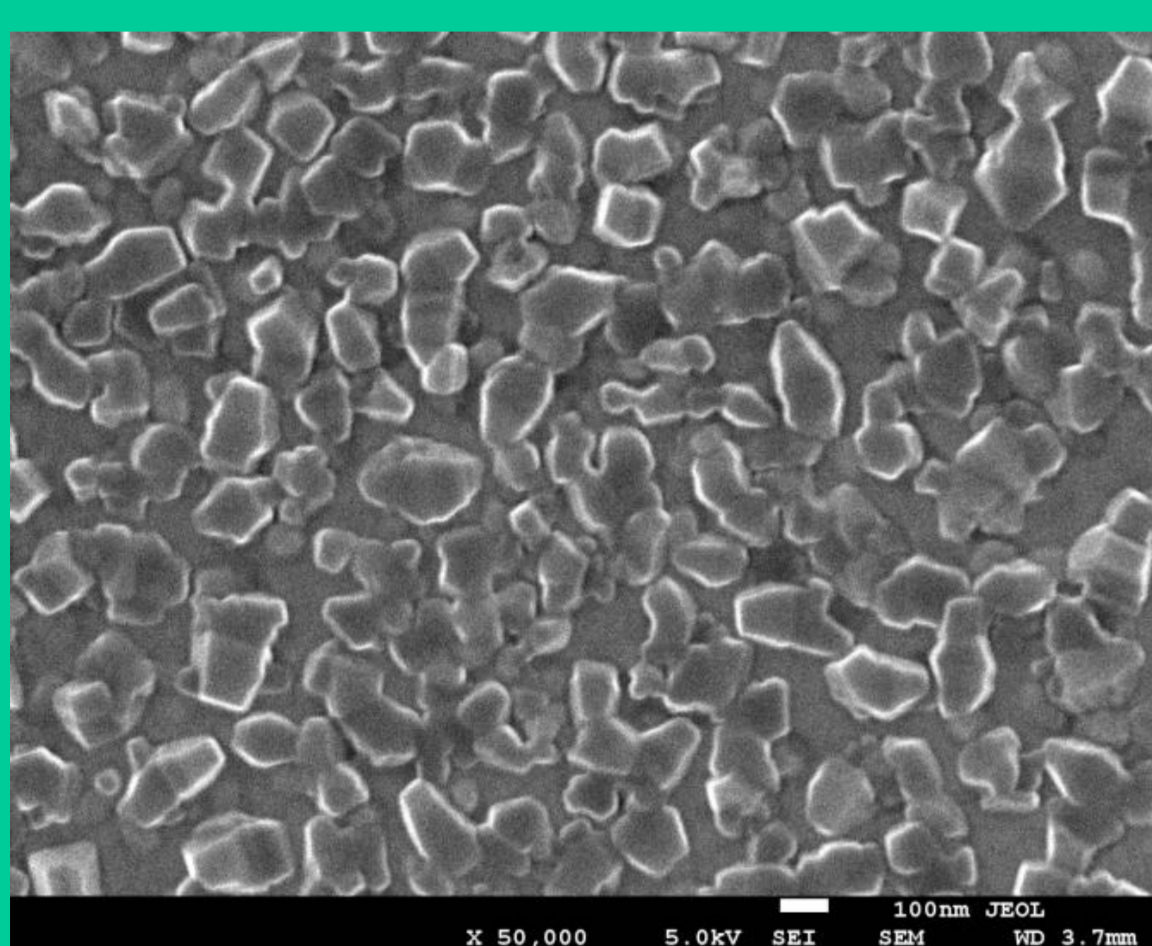
Final results:

125a

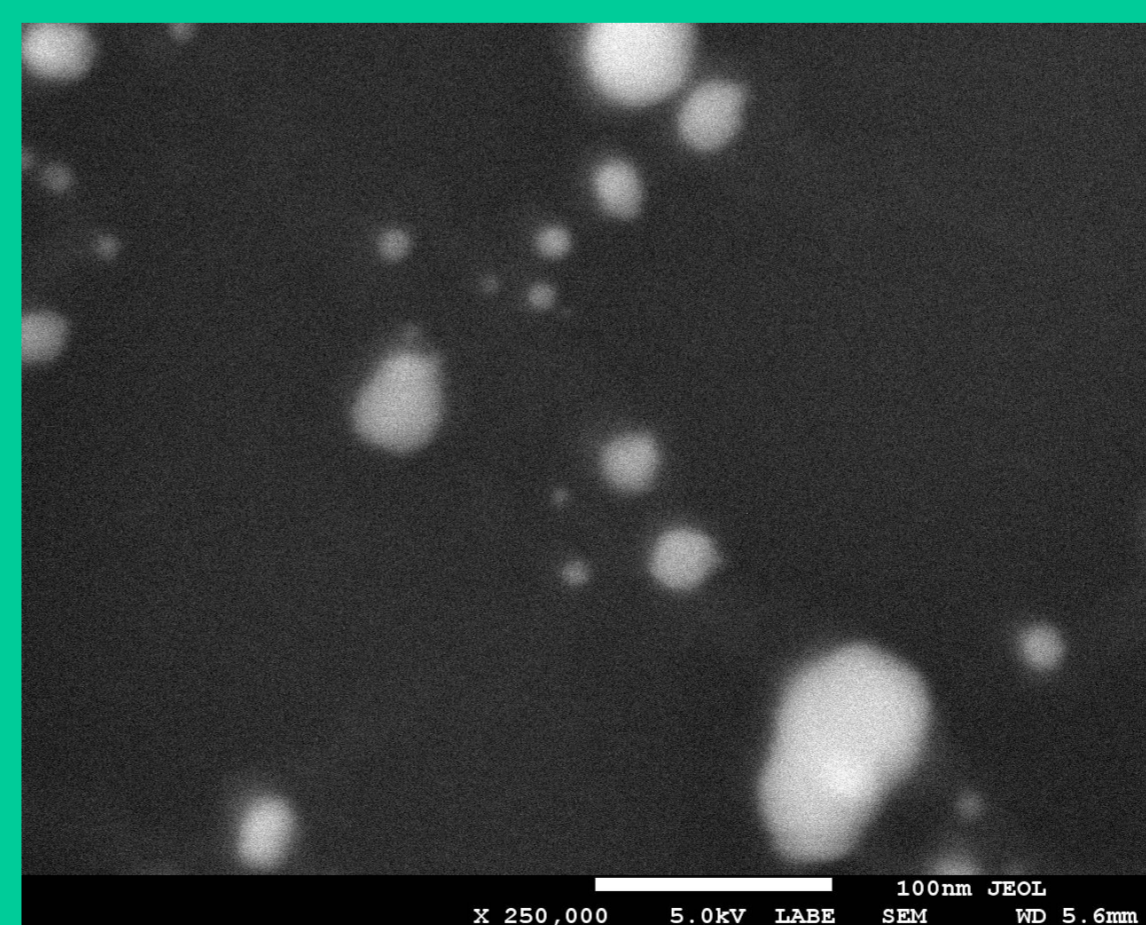
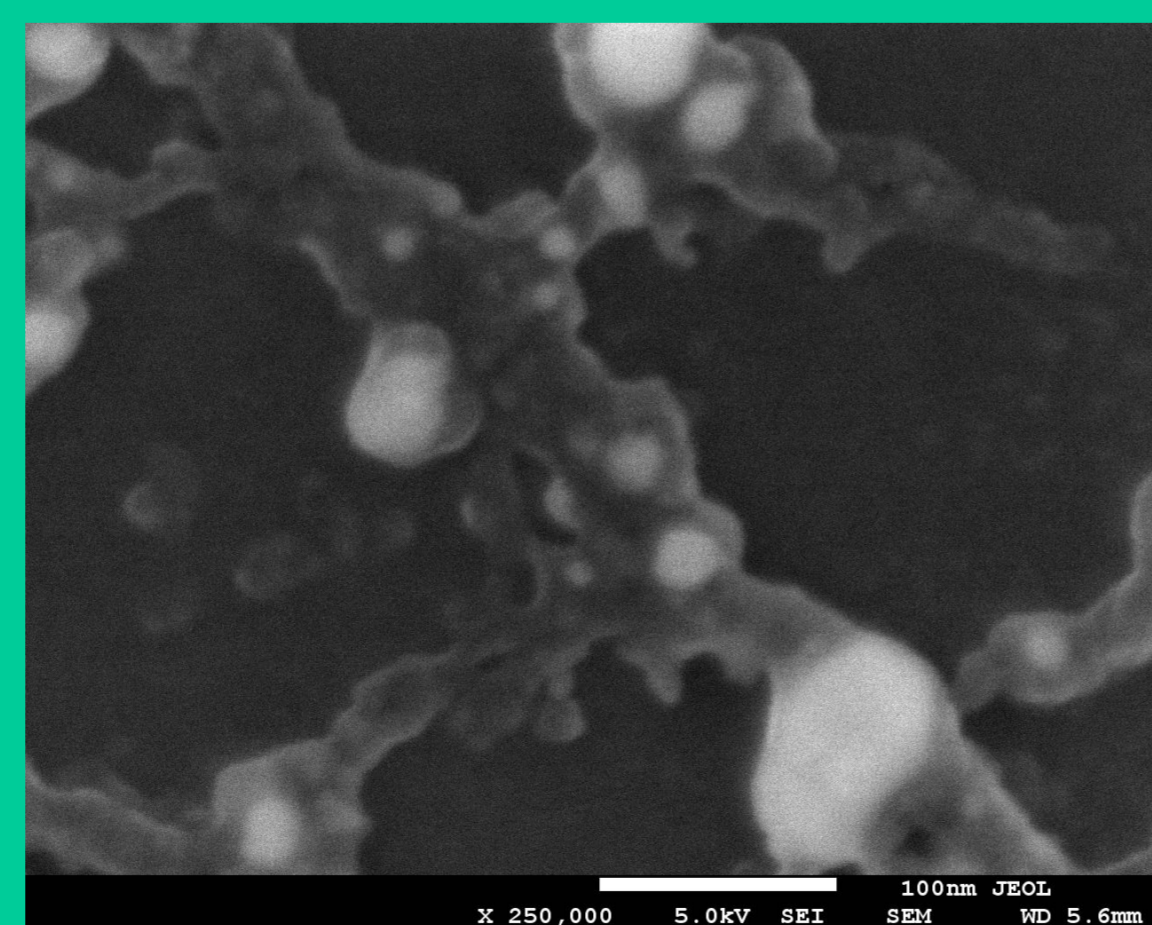
125b



SEM images of microstructure of deposited layers: before annealing after annealing



SAMPLE
125a



SAMPLE
125b

