# Transparent and conductive Pd-C nanostructural films

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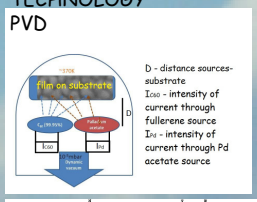
## INTRODUCTION

Transparent conducting films have been studied extensively because of their broad range of application such as transparent electrodes in display, in photovoltaic devices and optoelectronic systems.

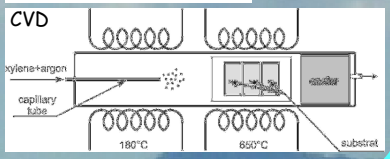
In this presentation we want to present carbonaceous –palladium films (C-Pd films) deposited on glassy or fused silica substrates. These films were obtained by two ways; first method was PVD process. Second method was PVD process followed by pyrolitic CVD process under influence of xylene. In PVD process we uses two separated sources containing fullerenes and palladium acetate. In CVD process we were modifying C-Pd films prepared by PVD. Obtained films were characterized by SEM (topography and morphology), AFM (topography) and adhesion, resistivity and by UV-VIS- FTIR absorption spectroscopy.

## TECHNOLOGY

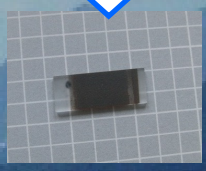
PVD



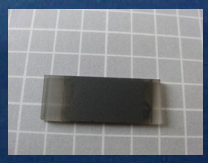

CVD



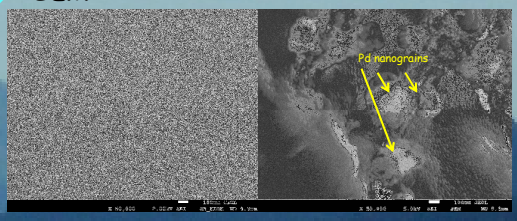

| Sample no | I Pd [A] | I C60 [A] | D [mm] | Time [min] | Film thickness [nm] |
|---|---|---|---|---|---|
| PVD1 | 1 | 2 | 60 | 5 | 300 |
| PVD2 | 1,2 | 2,1 | 69 | 8 | 300 |



| Sample no | I Pd [A] | I C60 [A] | Dc60 [mm] | Time [min] |
|---|---|---|---|---|
| PVD1 | 2.1 | 1.3 | 54 | 10 |
| PVD2 | 2.1 | 1.3 | 77 | 10 |
| | Xe flow [ml/min] | Ar flow [ml/min] | Temperature [K] | Time [min] |
| CVD/PVD1 | 0.1 | 3 | 923 | 30 |
| CVD/PVD2 | 0.1 | 3 | 923 | 30 |

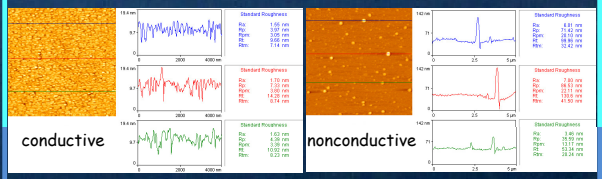


## SEM




SEM images of PVD C-Pd film and CVD/PVD C-Pd film

## AFM



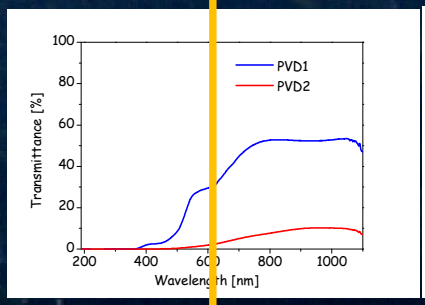

Average roughness

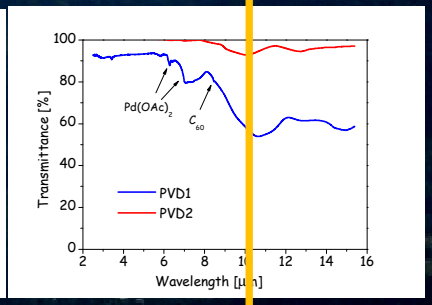
1.55nm 3.1nm

Properties of prepared C-Pd films

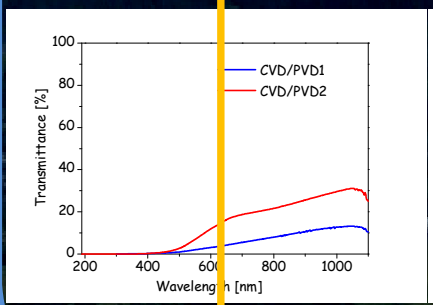
| Sample no | Pd content Wt % | C-Pd film resistivity [kOhm cm] | Film thickness [nm] |
|---|---|---|---|
| PVD1 | 16 | 18 | 300 |
| PVD2 | ~10 | nonconductive | 300 |
| CVD/PVD1 | - | 14 | >> 400nm |
| CVD/PVD2 | - | 6000 | >> 400nm |

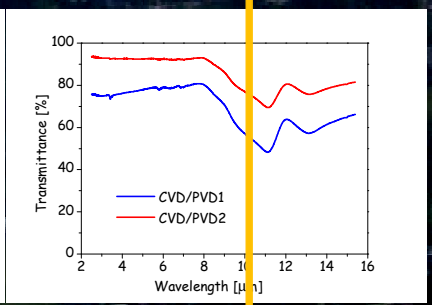
## UV-VIS and FIR transmittance




Trasmittance window

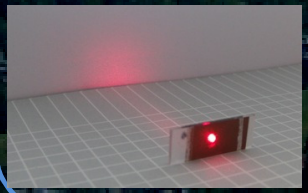


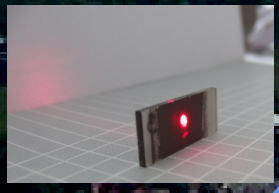




Transparency of C-Pd film deposited on fused silica for λ = 650 – 20nm laser line

PVD C-Pd film conductive, R = 18KΩ cm

CVD/PVD C-Pd film nonconductive





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Conclusions

100nm