# SEM/EDS AND XRD STUDIES OF Ag-Cd-Se THIN FILMS DEPOSITED ON POLYAMIDE 6

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### INTRODUCTION

The last decade have witnessed rapid progress in the field of hybrid nanostructures toward enhanced optical and electronic properties. The cation/anion exchange reactions from presynthesized nanostructures is an effective strategy to diversify inorganic-organic semiconductor nanomaterials as it provides reactive capabilities in tuneable composition and property solutions [1]. Recently we have extended cation exchange reaction strategy to inorganic-organic hybrid materials synthesis [2].

In this study, we present a combined CBD-SILAR-CE method, which enables us to fabricate Ag-Cd-Se thin films obtained on transparent polyamide 6 surface. The surface morphology and crystal phase structure were examined.

### **EXPERIMENTAL**



**Figure 1**. The principal route of combined CBD-SILAR-CE method for the Ag-Cd-Se thin films deposition on polyamide 6 substrate and its optical micrographs images. Magnification  $100\times$ 

SEM/EDS analysis were obtained using a scanning electron microscope JEOL JSM-5500LV equipped with an Energy Dispersive X-ray (EDS) microanalyzer IXRF Systems detector GRESHAM Sirius 10 with an accelerating voltage of 20 kV.

The XRD analysis was performed on the Bruker Advance D8 diffractometer, operating at the tube voltage of 40 kV and tube (emission) current of 40 mA.

Table. XRD peak assignments of Ag-Cd-Se thin films deposited on polyamide 6

Experir	nental data	Se (JCPDS#71-528)		CdSe (JCPDS#77-2307)		Ag <sub>2</sub> Se (JCPDS#24-1041)		Ag (JCPDS#03-1472)	
20	Observed d value, Å	Standard d value, Å	hkl	Standard d value, Å	hkl	Standard d value, Å	hkl	Standard d value, Å	hkl
22.36	3.92	4.05	120/210						
23.70	3.75			3.74	100				
24.91	3.57			3.51	002				
26.30	3.39	3.34	-122/- 212	3.29	101				
28.93	3.08	3.08	221						
29.83	2.99	2.94	023						
31.80	2.81	2.82	-222/- 213			2.89	102		
33.59	2.67					2.67	112		
34.95	2.56					2.58	121		
35.94	2.50			2.55	102				
36.62	2.45					2.43	013		
37.79	2.38							2.36	111
43.50	2.08							2.04	200
48.71	1.87	1.86	333	1.86	200	1.87	014		
52.73	1.73	1.74	-342/- 432						
68.99	1.36			1.38	211				

# RESULTS



Bottom	Element	wt.%
	Se	16.256
200 Mm	Cd	2.567
	Ag	81.177



**Figure 2.** SEM micrograph and comparative energy dispersive spectra (EDS): a – top surface, b – cross-section, c - bottom surface of Ag-Cd-Se thin films deposited on polyamide 6 substrate

### CONCLUSIONS

SEM analysis confirms a very disordered morphology with a non-uniform coverage of different-sized clusters. Moreover, EDS spectra analysis clarifies film of different chemical composition on the each side of polyamide (Fig). These results were confirmed by XRD analysis showing a complex Se-CdSe-Ag<sub>2</sub>Se film crystalline composition with trigonal Se (JCPDS#71-528), hexagonal CdSe (JCPDS#77-2307), orthorhombic Ag<sub>2</sub>Se (JCPDS#24-1041) and cubic Ag (JCPDS#003-1472) peaks.

#### REFERENCES

- 1. J. Zeng, Y. Xia, U. G.D. Moon, Y. Min Jeong, Nano Today, 6 (2011) 186-203.
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