COMPARATIVE STUDY OF SiOx LAYERS DEPOSITION USING THERMAL AND UV-ASSISTED CURING OF PERHYDROPOLYSILAZANE

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The development of new protective coatings from polymer nanocomposites for flexible solar cells will allow this technology to enter the mass market.

In this work, we investigate the effect of different curing conditions on the degree of film conversion from perhydropolysilazane (PHPS) to SiO_2, which will serve as a matrix for a protective coating. Research groups reported that thermal curing of PHPS produces a film that is completely converted to SiO_2, while UV curing gives only partial conversion [1]. However, they all used mainly the glass substrates that contribute to the IR-optical properties of the samples. We used the glass/Mo substrates to avoid this problem.

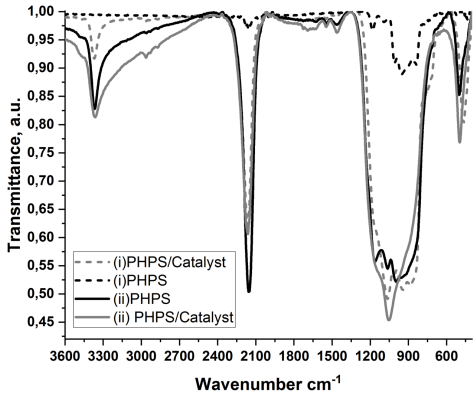

Fig.1 FTIR spectra of samples.

Studying 4 films were prepared by spincoating from PHPS and PHPS/Catalyst solutions in dibutyl ether (durXtreme GmbH) onto the glass/Mo substrates and cured in (i) an oven (180°C 60 min) or (ii) under the combined UV lamps irradiation (40 min, 185nm+254nm wavelengths). Fig. 1 shows that the FTIR spectra of all samples differ from each other. This indicates the formation of samples with different degree of PHPS conversion to SiO_2. XPS data showed that the content of oxygen and silicon in the obtained layers is practically equal after thermal curing. On the other hand, the films are completely converted to SiO_2 under the UV irradiation. This result can be associated also with additional back-reflection of UV from the Mo layer, which intensifies the transformation processes of the PHPS to SiO_2. However, door still opened for optimization of the curing technique of PHPS.

References

1. A. Morlier et al., 2014, *Thin Solid Films*, 550, 85–89

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