

VHF Plasma Etching of Patterned PMMA (PV-6)



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Scientific Achievement:

We generated large-area regular micro/nano-size patterns in PMMA on flexible ultrathin glass substrates by means of nano imprint lithography and subsequent VHF plasma etching

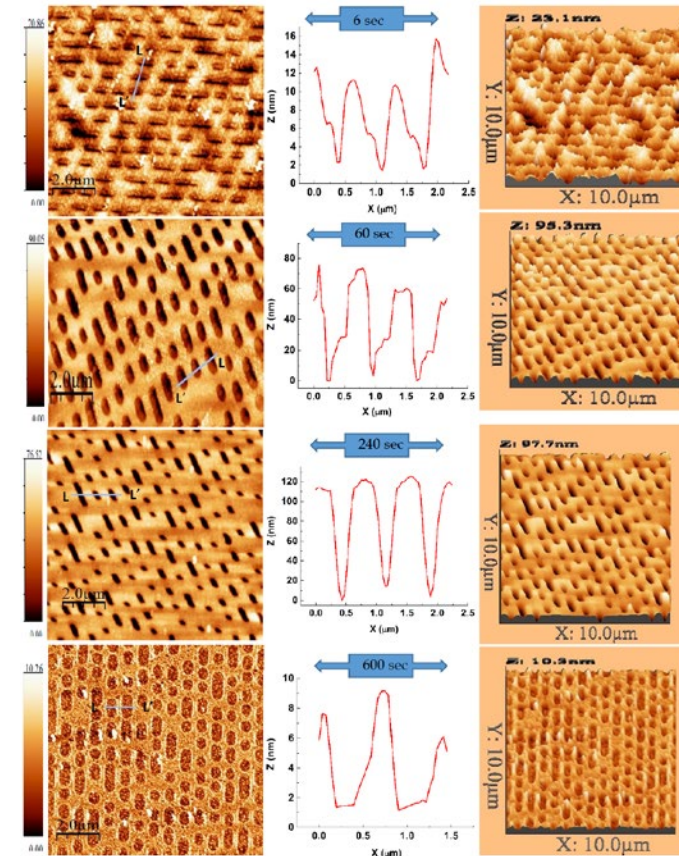
Significance and Impact:

Use of micro/nano-size pattern in optoelectronic applications can lead to improvement in the energy conversion efficiency of thin-film solar cells. These micro/nano-size patterns can also be used for LED applications.

Research Details:

- 1) We have reported embossing and plasma etching of polymer (PMMA) coatings on Corning® Willow® Glass substrates (thickness = 150 μm)
- 2) The embossing was done by thermal nanoimprint lithography (T-NIL) using a 3"-size Ni mold having fine surface features
- 3) The plasma etching was performed under VHF (40.68 MHz) using Ar/O₂ gas mixture in an asymmetric capacitive-type plasma reactor for different times (6 s, 60 s, 240 s, and 600 s)
- 4) The surface topography obtained from AFM measurement for the etched samples indicates that the processes of surface reactions and the ion-impact energy both play important roles in the removal of the PMMA
- 5) This study generates an understanding of the plasma etching process of micro/nano patterned PMMA.

Publication(s): A. Mandal, A. Kole, S.M. Garner, and P. Chaudhuri, "Study of the VHF plasma etching of micro/nano patterned PMMA coated on ultra-thin flexible glass substrates," *Plasma Process. Polym.* 2016, DOI: 10.1002/ppap.201600016



2-D morphology

line profile

3-D view

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