

Surface modification by low energy ion source with closed drift and extended acceleration region

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Closed drift thruster with extended acceleration region, which is called as stationary plasma thruster (SPT), was adopted for surface modification of polymer and ITO and nano patterning of InP. Since it has advantages of high efficiency of gas ionization, low ion beam energy, charge neutralization effect, and stable operation, it's been researched as applicable ion source for surface modification. When reactive ion beam with high fluence was irradiated on polyimide (PI) and PVDF surfaces, they showed superhydrophilicity and wetting angle was reduced below 2-4 degree within a few seconds. In addition, oxygen ion beam was irradiated on ITO/glass, the wetting on ITO was also reduced down to less than 2 degree. Thus it can be presumed that this can replace plasma treatment process in OLED. While Ar ion beam with 180 eV energy on InP(100), ion beam induced nano structuring was observed. As the incident angle and ion flux were changed, various kinds of nano cone, nano ripple, and nano mounds were formed. In particular, uniform nano cone or nano needle was uniformly distributed, which was firstly observed in the very low energy ion beam irradiation below 200 eV. From the results, the very low energy reactive ion beam irradiation revealed that it was very effective in formation of functional group within a very short time on materials surfaces. Moreover this can produce self-aligned bottom up nano structure. Finally, we would like to introduce the newly designed horse-track like linear SPT manufacturing.