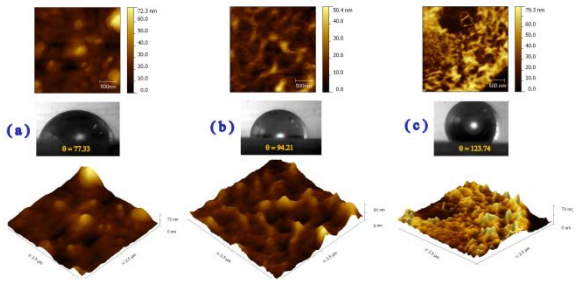

Figure 4: AFM &Contact angle measurement. (a) Pristine CdSe, (b) 5 wt% Sb doped CdSe and (c) 10 wt% Sb doped CdSe

In order to investigate the surface properties of the CdSe thin film following the addition of Sb, the wettability of the CdSe thin film was characterized by contact angle measurements. Wettability test gives information about the interaction between a liquid and a solid in contact angle. The hydrophobic or hydrophilic nature of the materials is confirmed by the wettability test. Higher wettability results in a smaller contact angle with the surface and indicates a hydrophilic nature and vice versathe contact angle (θ) between a flat solid surface and a liquid droplet is given by Young's equation[13].

$$\cos\theta = \frac{\gamma_{SV} - \gamma_{SL}}{\gamma_{LV}} \quad \text{------1}$$

Where γ_{SL}, γ_{SV}, and γ_{LV}denote the interfacial tensions of the solid-liquid, the solid-gas, and the liquid-gas interfaces, respectively. Contact angle measurements were carried out for all the prepared samples and are summarized in Table 1. The contact angle is found to increase from 77.33° to 123.74°, as shown in Fig. 4, which indicates that the surface wettability of the CdSe thin film is changed from a hydrophilic to hydrophobic nature by the addition of antimony. Moreover, surface roughness of the sample plays an equally important role in the wettability of a surface. Shibuichi et al. showed that the contact angle can also be tuned by the solid roughness in the hydrophilic region [14]. It is found that the addition of antimony results in an increase in contact angle of the CdSe thin films from 77.33° to 123.74°, which can be explained by the high surface roughness induced by antimony [14].Hence, the surface roughness of the film may proportional to the contact angle of the CdSe: Sb film.

4. Conclusions

The pristineand Sb doped CdSe thin films have been deposited successfully using homemade chemical spray pyrolysis unit. In all the cases, observed diffraction peaks were indexed to cubic sphalerite structure. The lattice constant of Sb (10 wt%) doped CdSe (a = 6.000 Å) is found to be slightly smaller than those of pure CdSe (a = 6.077 Å). There is a decrease in the average crystallite size with increase of Sb content in CdSe thin film. From optical absorption spectra, all the Sb doped CdSe films have extended a red shift compared to those of pristineCdSe film. Particularly the 10 wt% Sb doped CdSe film has extended a 52 nm red shift. AFM measurements reveal that the average surface roughness of the film increases from 1.86 nm to 6.10 nm.Moreover CdSe thin film is changed from hydrophilic to hydrophobic nature after the incorporation of Sb.

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