Supporting Information

Title

Homogeneous Liquid Crystal Alignment on Inorganic-Organic Hybrid Silica Thin Films Derived by the Sol-Gel Method

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Morphology Analysis

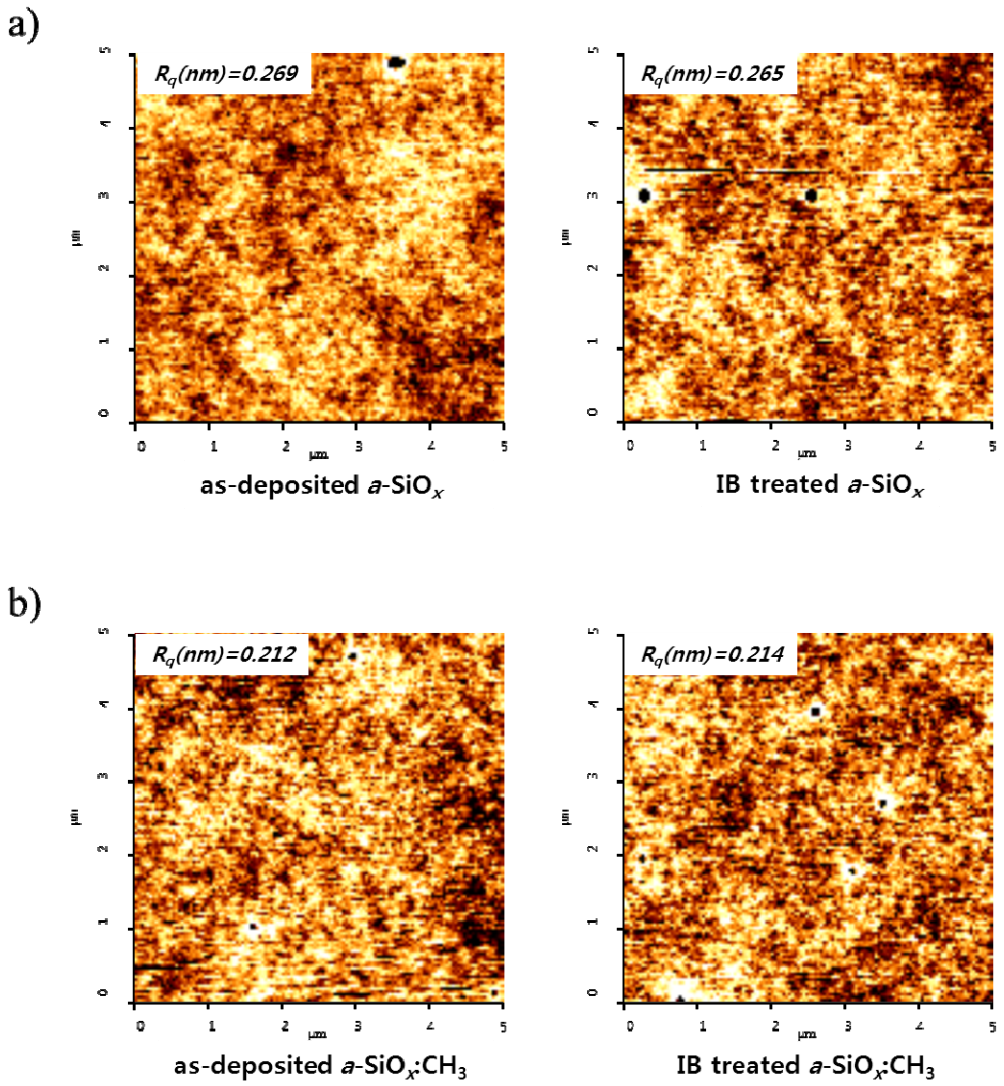

Fig. S1. AFM images of a 5μm×5μm area for the thin-film of (a) a-SiO_x (b) a-SiO_x:CH_3 before (left) and after (right) IB treatment for 5sec. The IB energy was 60 eV and the incident angle was 45°. All images cleary show no distingushable changes in morphology after IB irradiation.

Applications

It's well known that pretilt angle of LC is controllable by varying the IB condition. Thus we also found that the pretilt angle of LC on *a*-SiO_x:CH_3 thin-film is a function of IB irradiation time. The pretilt angle of the LC was changed from near zero to about 1° depending on the IB exposure time. The pretilt angle is directly proportional to the IB exposure time, which is in agreement with previous reports of our group.[1] (See Fig. S2a) . In addition, the transmittance of *a*-SiO_x:CH_3 alignment LC cell were also measured by UV spectroscopy (Jasco, V550) as shown in fig. S2b. We can obtain the higher transmittance compared with commercialized polyimide alignment layer in whole visible range. This result shows that the transmittance can be improved by the replacement of *a*-SiO_x:CH_3 , in place of polyimide alignment layer.

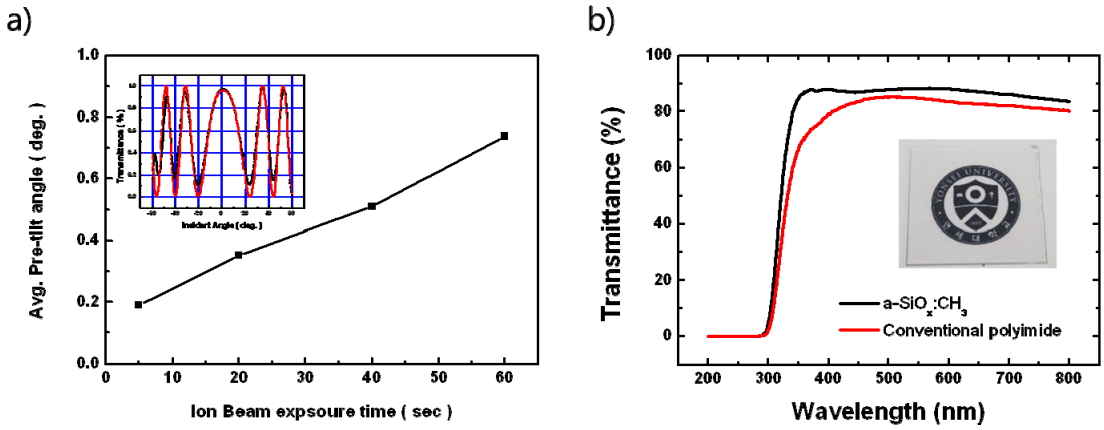

Fig. S2. (a) Variation of the pretilt angle of *a*-SiO_x:CH_3 cell as a function of the time of ion-beam irradiation. The pretilt angle of LC increases linearly with the ion beam exposure time. By varying the exposure time , we can control the pretilt angle of LC continuously. (b) The transmittances spectrum of cells with *a*-SiO_x:CH_3 (black line) and commercialized polyimide alignment layer (red line). This spectrum shows that high transparency was observed on *a*-SiO_x:CH_3 alignment layer compared with polyimide.

Single Liquid Crystal (5CB) Measurement

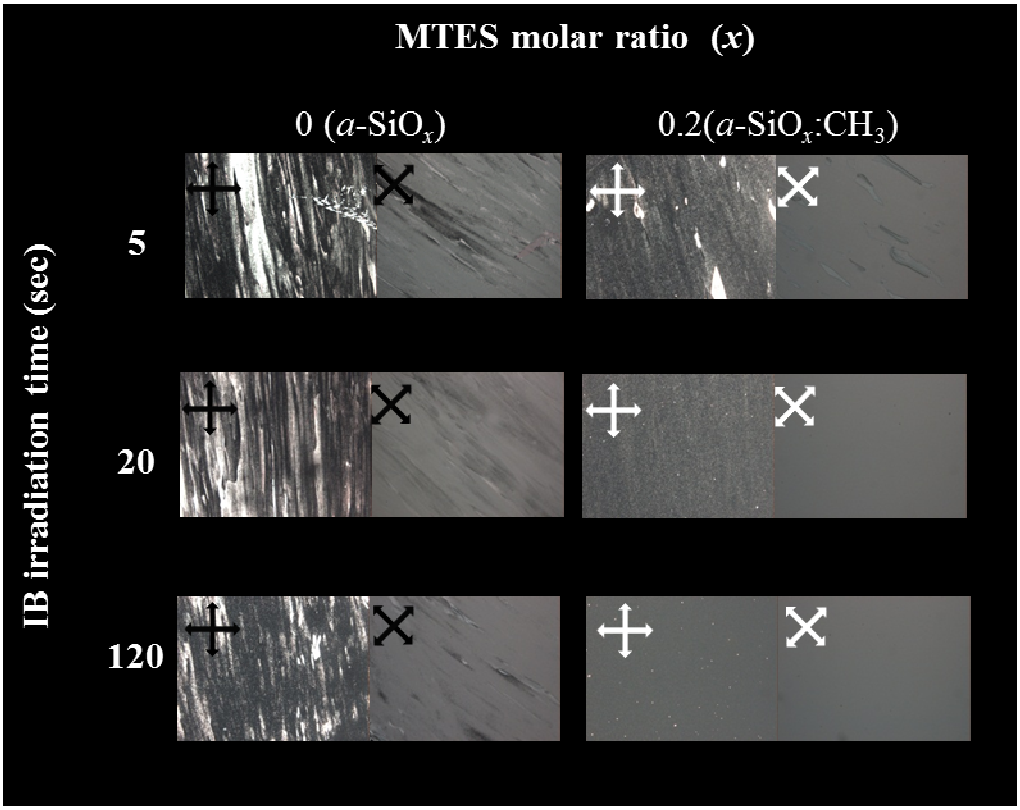

Fig. S3. Optical photomicrographs and polarized optical microscopic images of antiparallel liquid crystal cells in a cross-Nicole state. Liquid crystal cells with *a*-SiO_x and *a*-SiO_x:CH_3 alignment layers were treated with ion-beam irradiation for up to 120 sec. And a single liquid crystal (5CB) was injected in isotropic state.

References

1. Kyung Chan Kim, Han Jin Ahn, Jong Bok Kim, Byoung Har Hwang, and Hong Koo Baik, Langmuir, 21 (24), pp 11079–11084 (2005)