Magnetic-field Assisted Assembly of Colloidal Ellipsoids

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The real space structure of a classical smectic phase consisting of rod-like colloids is schematically shown in Fig.S1(a). In this case the particles align along their long axes. As a result, the smectic layers form in a direction parallel to the length of the rods. The corresponding Fourier space image or the expected x-ray diffraction pattern of the aforementioned smectic phase is shown in Fig.S1(b)[1,2]. However, the smectic phase formed by ellipsoidal particles which in the presence of an external field align with their short axes parallel to the external field, has the appearance as shown in Fig.S1(c). The double headed red arrows indicate the spacings along the smectic layers. Correlations between particles which belong to different layers (as indicated by green lines) results in the formation of a diffused scattering line as shown in Fig.S1(d) in green. Although our schematic gives an impression that the long axes are also aligned, but this is not the case in general. As mentioned before the particles align with their short axes along the field direction and their long axes are free to rotate about this direction (Fig. 2). For the sake of clarity in illustration, we have chosen to highlight only one such possible conformation out the ensemble of all possible rotational conformations. Further it is important to note that the smectic layers in this case are not rigid but can fluctuate, Fig.S1(e), resulting thereby in an elongation of the smectic peak in vertical direction as indicated by dark yellow in Fig.S1(f).

REFERENCES

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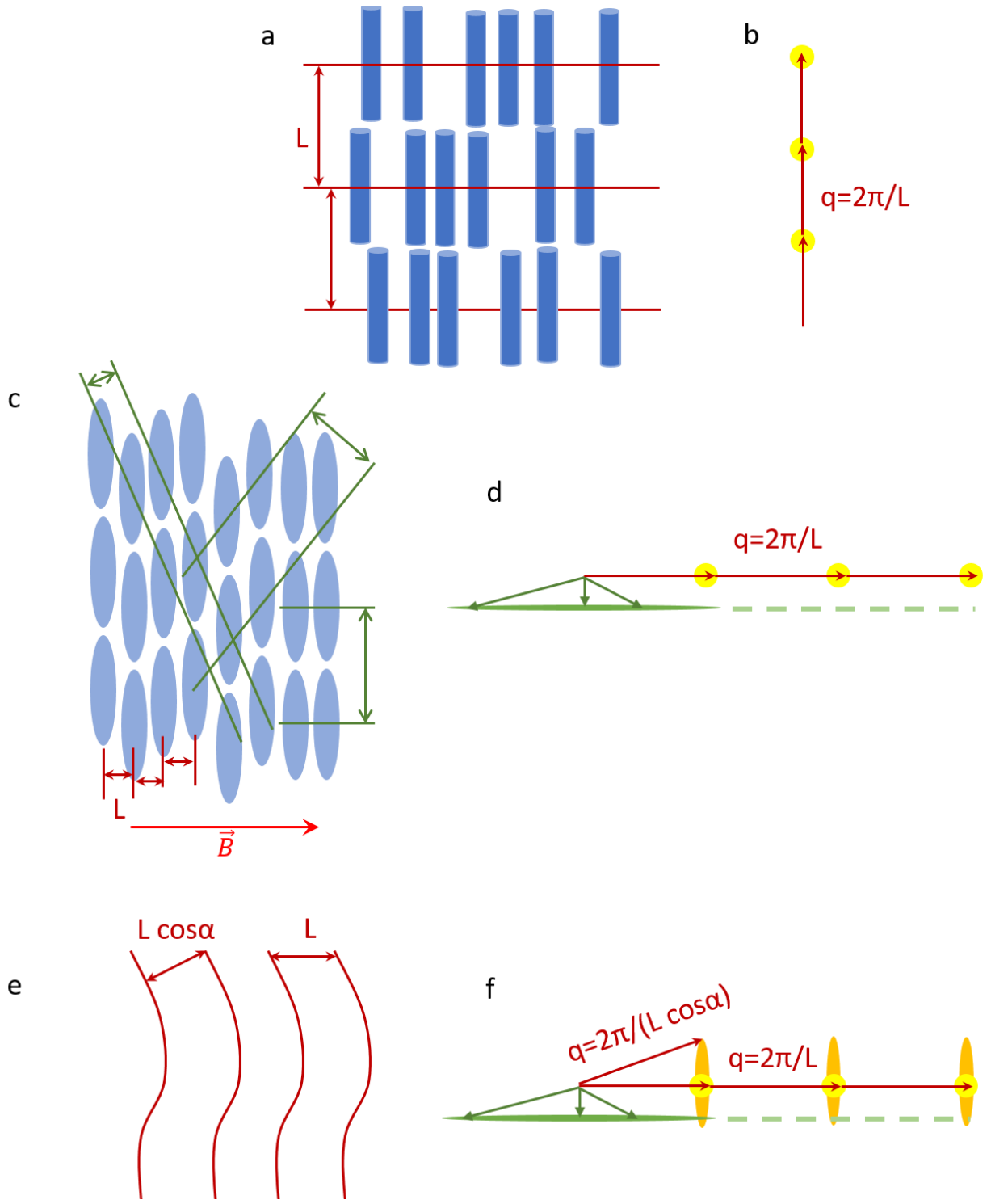

FIG. S1. (a) Real space image of a classical smectic phase formed by colloidal rods and (b) expected x-ray diffraction pattern for it. (c) Real space image of *oblate* smectic phase formed by ellipsoids and (d) expected diffraction x-ray diffraction pattern for it. (e) Smectic phase with layer fluctuation and (d) the corresponding change in the diffraction pattern.