

Colloidal gold nanosphere dispersions in smectic liquid crystals and thin nanoparticle-decorated smectic films

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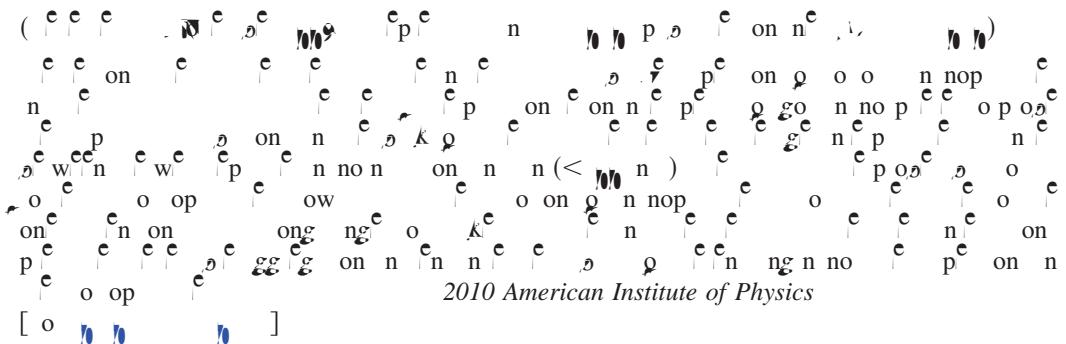
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I. INTRODUCTION

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(Φ) φ p^e n o p^e w C n e A^e p^e
n e o o w w on n o e o s^e o o w
 e op e a o p on e e o φ e o o w
 e po e n p^e e e n o e φ e o o w
 e p^e w n po e gn e n o ng e
 e n^e ng e o o w ow o e po e o ng e
 e gn e A p^e w e director ong e
 e ng e on w e o n e d^e o p on p^e n
 e A^e p^e (at C) were obtained using the
Ocean Optics nature ber optc spectro eter (B)
nte rated w \downarrow a polarizn croscope Oy pus BX
(To yo Japan) For t e AFM studies t e xture of t e
coated GN s n et y aco o and LC w c was o o
en zed by cont nuous strn for was spn coated at
revo ut ons per nute on a s con ()substrate T esa p e
surface orp oo y was studied usn nanoscope III AFM
(fro D ta Instru ents) n t e tappn mode To easure
t e avera e t c ness of t e s ectc surface supported

the surface shows the defect induced depressions in the case of pure CB [Fig. (f)] and the raised bumps due to particle-induced layer deformations in the case of the LC dispersions [Fig. (g)]. Once the sector A area is analyzed so that it possesses a quasirandom orientation or perpendicular orientation to the surface or possibly visualized by AFM reflects the profile of the top sector layer in the topography. The apparent variation in the height of individual bumps might be due to polydispersity of particles sizes (transmission electron microscopy data shows that particle diameters vary from 10 to 15 nm with an average size of ~12 nm) for a given deposition of different

spere dispersions in smectic liquid crystals of great fundamental interest to explore the feasibility of achieving ordered periodic structures composed of nanoparticles and spatial structures similar to those found in nematic LCs.

IV. CONCLUSIONS

In conclusion we have demonstrated the enhanced colloidal stability of smectic A LC nanoparticle dispersions compared to those in neat smectic A experiments and computer simulated spectra we have shown that the interparticle separations between stacked nanoparticles in the bulk of smectic A are around even for very concentrated suspensions. Nanoparticles in solution do not aggregate but rather modify the free surface profile of the due to layer distortions around the suspensions in the LC bulk. These nanoscale dispersions are of interest for technology as they require the constant presence of nanoparticles and a dielectric matrix with tunable properties and interparticle distances which may provide means of spatial structures.