# Three-dimensional textures and defects of soft material layering revealed by thermal sublimation

, ,1,2, ,1, =1 =1 , =1 =1 , . .. ' , =1 A. ,2,
=1-1- =1 =1,2

Gr f m m r E r, r A f r r f r r - E r r, r m f r r r r Gr , r r f m , U 305-701, r ; r m fP r E r f r, r, 80309; A r r 305-600, r

becoming more solid-like and h s free ing in he SmA la er e re. YHK1 herefore has s r c ral charac eris ics con enien for hermal s blima ion s dies of smec ic la er organi a ion.

Sample drops ere spread o a 5- o 10-µm hickness in he iso ropic phase on glass or silicon afer s rfaces pre io sl spin-coa ed i h pol e h leneimine (PEI; Aldrich; molec lar eigh of 60,000) o pro ide random planar anchoring of he LC. Upon cooling in o he SmA, he s rface h s ind ces planar alignmen , hereas he op of he LC film as open o air o ind ce homeo ropic alignmen . The res l ing geome rical fr s ra ion can be accommoda ed b he forma ion of oroidal focal conic domains (TFCDs) (12, 13, 20, 21). In he hin films prepared here, his endenc led o he spon aneo s appearance of large he agonal arra s of niforml si ed and spaced TFCDs, sho n in PLM in Fig. 1*B* and *A* , Fig. S2, ob ained b holding he sample empera re ~5 C belo he Iso-SmA ransi ion em-pera re for a fe min es. These circ lar birefringen domains ha e he classic TFCDs, e ensi el charac eri ed in pre io s research, i hin hich he smec ic la ers form a se of nes ed oroidal s rfaces bo nded b a c linder normal o he s rface i h la er c sps along a s raigh line passing hro gh he a is of he c linder (1, 22) ( *A* , Fig. S2). The kno n la er s r c res of hese TFCD arra s make hem a rac i e candida es for he e al a ion of hermal s blima ion as a probe of smec ic la er s r c re.

S blima ion s dies ere done on hese YHK1 films b firs cooling he films o room empera re and assessing hem op i-call for on on foro3c339.

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effec i el incorpora ed in o he processing of self-assembled la ered sof ma erial s s ems.

I is impor an o emphasi e ha he ma erial sed, YHK1, al ho gh e hibi ing a combina ion of proper ies ha make i a sef l demons ra ion ma erial for 3D is ali a ion b s blima ion, does no possess an par ic larl special charac eris ics ha sho ld make i niq e in his regard. For e ample, YHK1 preser es he smec ic la ering s r c re pon slo cooling o room empera re. Ho e er, i is ell kno n ha a ide arie of sof la er s r c res can q i e generall be preser ed b rapid cooling o room empera re or belo ; for e ample, here is broad applica ion of rapid q enching in FFTEM s d of LC and sof ma erial s r c res. Tha is, appropria e combina ions of cooling ra e and holding empera re can preser e mos sof la ering s r c res. YHK1 is a ma erial ha hermall s blimes in he la ered phase of in eres a a ra e ha enables re ela ion of he in ernal s r c re in a con enien ime. S blima ion ra e is mos l de ermined b molec lar si e and empera re. A lo empera re, for e ample, in FFTEM a 77K, sof ma er organics, s ch as LCs, ill no s bs an iall hermall s blime, b he hermal s blima ion of small molec lar componen s, s ch as a er or sol en s, is commonl sed in he "free e e ch" aria ion. Ho e er, in he circ ms ance here s r c re preser a ion req ires lo empera re, s blima ion is no necessaril limi ed o hermal s blima ion b ma be assis ed b ion bombardmen or e pos re o ario s e ching modali ies, s ch as