Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Binary colloidal crystals of oppositely charged particles M.E. LEUNISSEN, C.G. CHRISTOVA, R. VAN ROIJ, A. IMHOF, A. VAN BLAADEREN, Soft Condensed Matter, Debye Inst., Utrecht University, The Netherlands — We show that sterically stabilized PMMA spheres in a density and index matching cyclohexyl bromide-decalin mixture can form a system of *oppositely* charged colloids with long-range attractive interactions. The two particle species (+ and -, both $\sim$ 2 micron) had a different fluorescent label, so as to distinguish them with confocal microscopy. As determined by (micro-) electrophoresis the particles carried tens to hundreds of charges, while the charge-ratio between the two species was asymmetric ($\sim$ 1:4). We observed dense CsCl-type crystals, which are so far only predicted for same charge particles. Crystals nucleate in $\sim$ 40 hours from a highly structured, dense fluid and coexist with a fluid or very dilute gas phase of small clusters for at least weeks. The large crystals ($\sim$ 0.2 mm a side) display 'terraces' and contain point defects, like substitutional particles and vacancies, where a sphere of one species is missing. We used a static electric field to determine the sign of the particle charge *in situ* and to induce melting of the crystals. We found other structures for different size ratios. Moreover, we made binary crystals with particles that have different chemical compositions. This offers the possibility to further modify the structure, by selectively treating one of the species after crystallization.

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Date submitted: 01 Dec 2004 Electronic form version 1.4