Self-assembly of two-dimensional colloidal clusters

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We study the structure of binary monolayers of large (3µ m diameter) very hydrophobic (A) and large (3 µm diameter) hydrophilic (B) or small (1 µm diameter) hydrophilic (C) silica particles at an octane/water interface. By tuning the composition and packing geometry of the mixed monolayer, we find that a rich variety of two-dimensional hexagonal super-lattices of mixed A/B or A/C clusters are formed, stabilized by short-ranged electrostatic induced dipole interactions. The cluster structures obtained are in excellent agreement with zero temperature calculations, indicating that the self-assembly process can be effectively controlled.