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Electric Field-Induced Assembly of Highly Crosslinked Ionic Microgels

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The electric field driven assembly of highly crosslinked ionic microgels at effective volume fraction, ϕeff=0.04 is studied using a confocal microscope. The isotropic microgels undergo structural transitions depending on the field strength and microgel concentration. At low ϕeff, the ionic microgels interact via long-range Yukawa type interaction and the interparticle separation between microgel particles is much larger than the microgel particle diameter. Each microgel particle experiencing the field can be considered as a point dipole. These point dipoles are attracted mutually and assemble along the direction of the applied field and align to form linear chains. At a higher field strength, a gas phase co-existing with islands of a bct and ring structures are observed in the xy plane. Clusters with fewer microgels tend to form rings, whereas larger clusters arrange into bct structure. The microgels instantaneously redisperses once the electric field is turned off.

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