Glass-like kinetic arrest at the colloidal gelation transition

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We describe the results of experiments on the colloidal gelation transition using (depletion) attractive colloidal particles. We show that gelation of colloidal suspensions exhibits many of the hallmarks of the colloidal hard sphere glass transition. Like the colloidal glass transition, the structure factor, as probed by static light scattering, remains essentially unchanged as the gelation occurs. Like the colloidal glass transition, the intermediate scattering function (ISF), as probed by dynamic light scattering, exhibits a two-step decay. Like the colloidal glass transition, the time scale of the final decay diverges as ϕ_c is approached. Like the colloidal glass transition, for samples very close to ϕ_c, the ISF's exhibit a scaling behavior in scattering wave vector, q, with the scaling factors following the form of the static structure factor, $S(q)$. This remarkable similarity between the kinetic behavior of these two disparate transitions suggests that both are in fact intrinsically related, with the fluid to solid transformation driven by crowding, of single particles for colloidal glasses and of clusters for gelation.