Diblock Copolymer Brushes: soft crystalline patterning of a polymeric template

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Diblock copolymer brushes, made of hybrid solvophobic/solvophillic polymeric chains grafted on a surface, are systems that have shown the ability of self-assembling, at very high density conditions, into ordered structures. We show, for the first time, a large scale self-aggregation scenario of such complex systems in the semi-dilute regime. Patterns arising from the self-aggregation of the solvophobic parts of the grafted polymers, are shown to assemble into patchy aggregates. The interplay between the polydispersity in the self-assembled patches and the softness of the underlying solvophillic carpets, leads either to a crystal forming or to the formation of a disordered fluid of patches. We show how, contrarily to hard particles systems, the system undergoes a disorder/order/disorder transition, as an increase in grafting density strongly affects the monodispersity of the self-assembled patches.

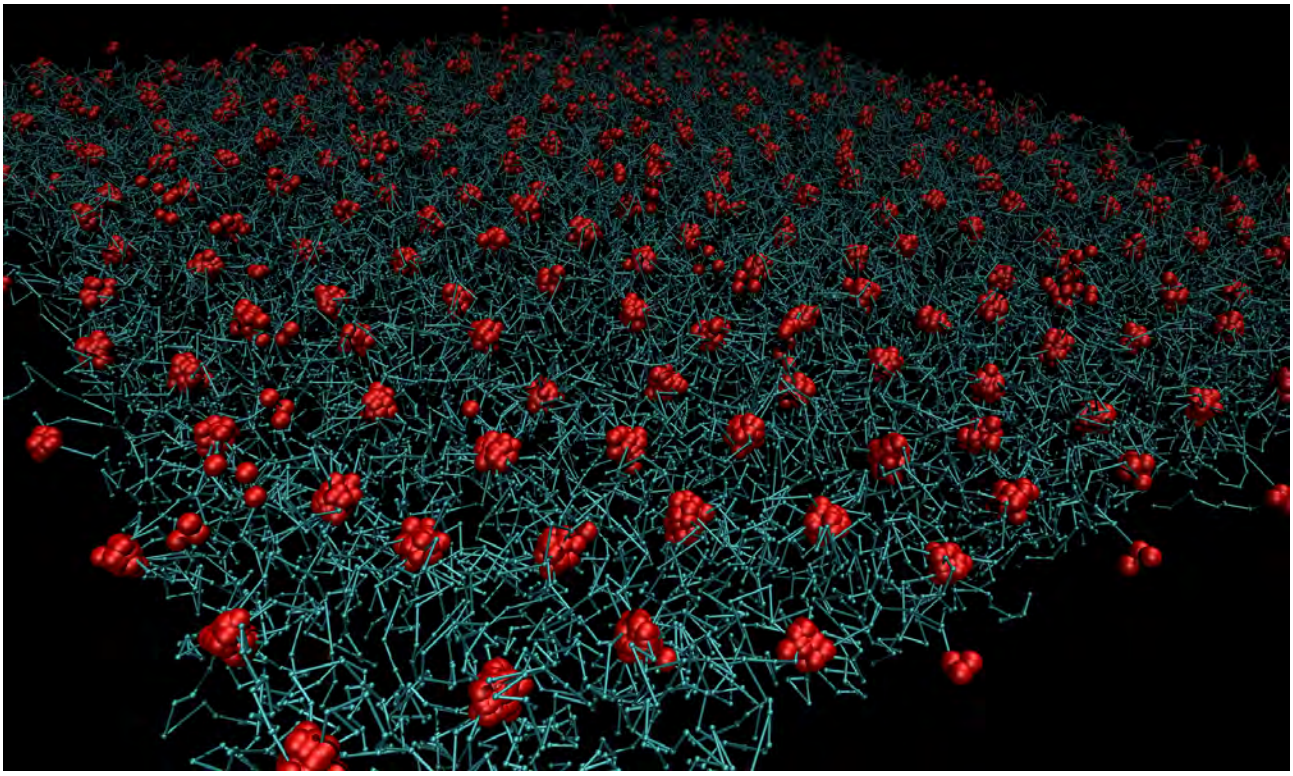

Figure 1 A diblock copolymer brush showing self-assembled patterning. Red patches are formed by the solvophobic ends of the polymers and stabilise a soft-crystalline carpet.

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