THE CONFORMATION OF AMPHIPHILIC POLYMER SPHERICAL BRUSHES ATTACHED TO A NANOPARTICLE

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The structure of amphiphilic spherical brush consisting of ananoparticle as a core and long amphiphilic chains as a shell is considered using scaling approaches and the mean-field theory for the comprehensive study of aggregate structure in aqueous solution.

Such nanoparticles of SiO2 with hydrophobically modified polyacrylamide brushes are synthesized to increase oil recovery.[1]

The amphiphilic nature of macromolecules is taken into account by attaching the hydrophilic side group P to some fraction of monomer units of hydrophobic H backbone. The H groups have strong attraction to each other which causes the aggregation of macromolecules. On the other hand, hydrophilic P groupareattracted to solvent molecules and force the aggregates to increase their surface. It was shown that depending on the surface activity of monomer units in poor solvent, the macromolecules could form dense homogeneous spherical globules or join into several cylindrical aggregates with hydrophobic core and hydrophilic shell (rod-like structure), shown at the figure 1.

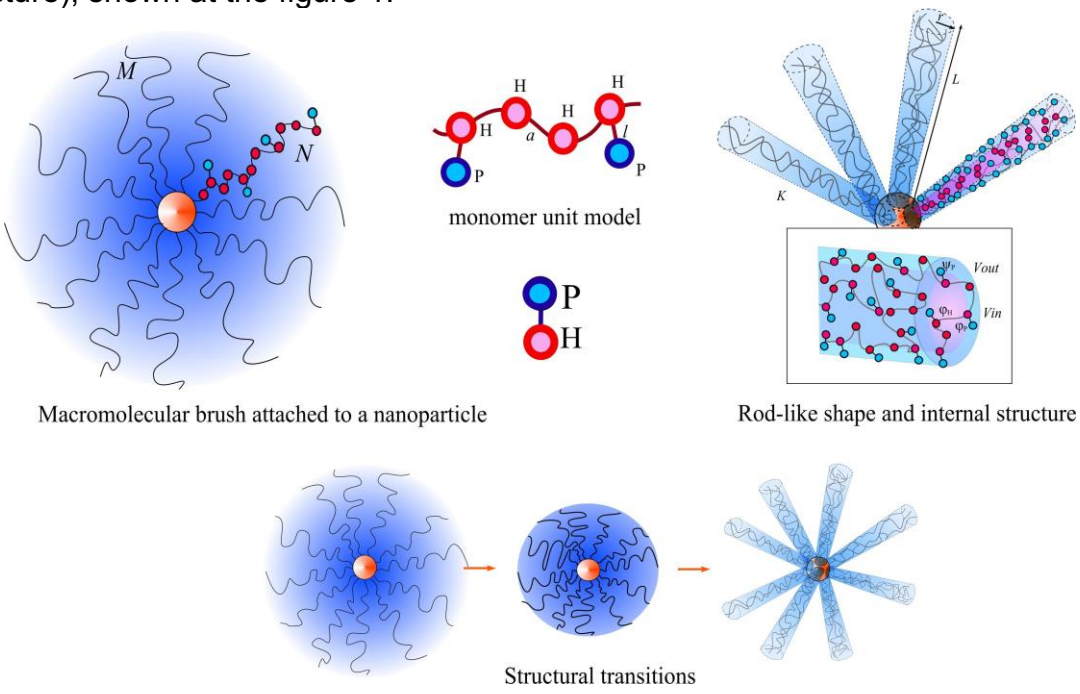

Figure 1. Sperical brush of amphiphilic polymers and structural transitions in aqueous solution

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References

1. W.Pu, R.Liu, K-Y.Wang, K-X.Li, Zh-P.Yan, B.Li, L.Zhao, *Ind. Eng. Chem. Res.* **2015**, 54, 798−807.