Steric Stabilization [pln44]

Colloidal dispersions can be stabilized by polymer chains grafted to colloidal surface.

Forms of attachment:

- attachment by chemical bond,
- lyophobic attachment (e.g. block copolymer with one block insoluble in dispersion medium).

Types of grafting:

- *brushes*: high density grafting with polymers strongly interacting,
- *mushrooms*: low-density grafting with polymers weakly interacting.

The effective repulsive force is in part osmotic in character and in part due to brush elasticity.

Grafted polymers tend to weaken vdW attraction between colloids. In poor solvents grafted polymers may enhance attractive force.

Depletion interaction: Attractive force between colloids resulting from reduced osmotic pressure.

For example, when polymers coils (globules of volume density n_{g}) of smaller size than colloidal particles are added to the dispersion medium, there exists a depletion zone near the surface of colloids. The osmotic pressure, $p_{\mathrm{osm}} = n_{\mathrm{g}} k_{\mathrm{B}} T$, is then reduced in the depletion zone and produces an effective attraction between colloids with overlapping depletion zones.

Quantitative analysis for specific geometry: [pex27].