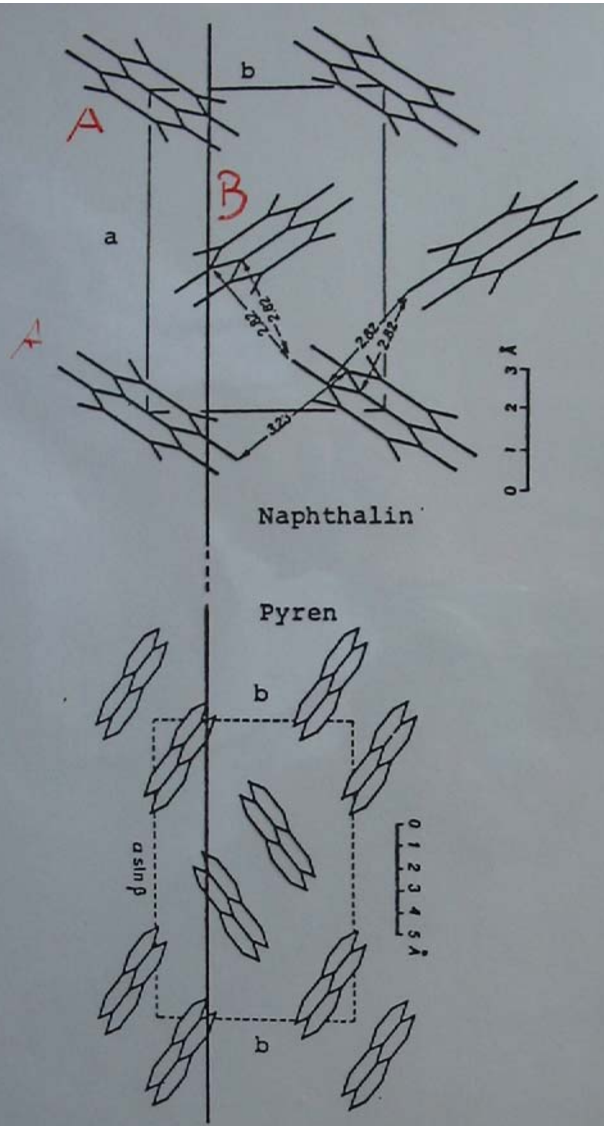
Vorlesung V03:

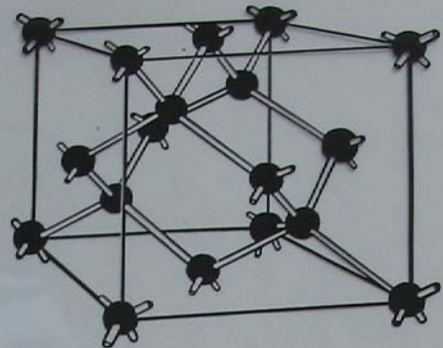
Soft Matter – Weiche Materie

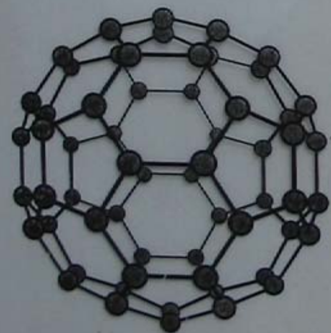
Prof. von Borczyskowski

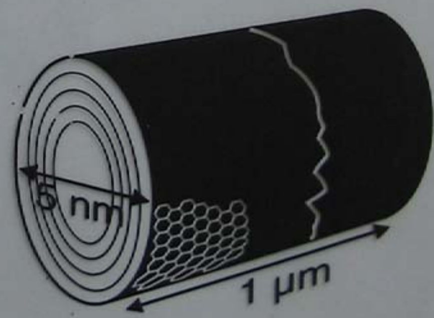
(18.04.2005)



Aus A.I. Kitaigorodsky
"Molecular Crystals and
Molecules", Acad. Press
N.Y. (1973)







Recognition

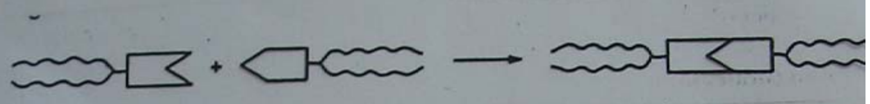
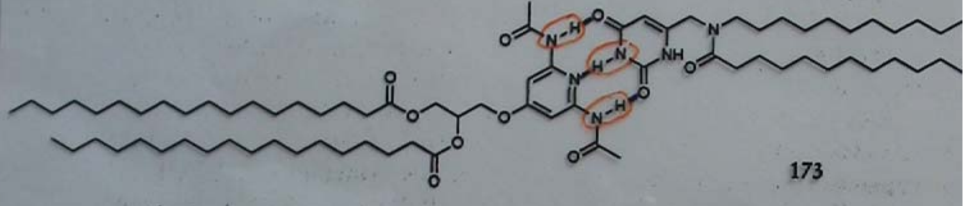


Fig. 38. Formation of a mesogenic supermolecule from two complementary componen



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N–H ·· N

O–H ·· O

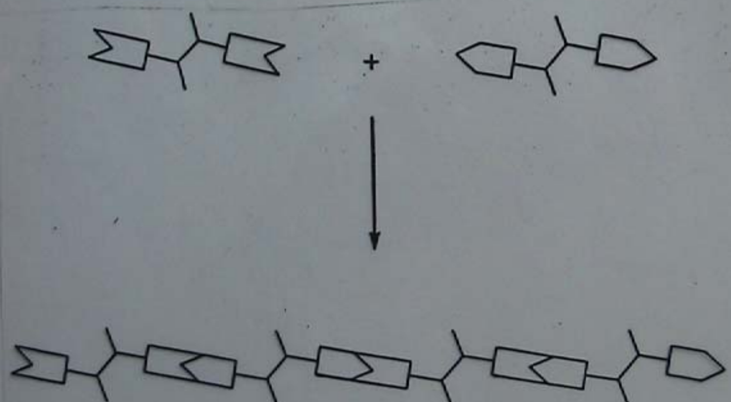
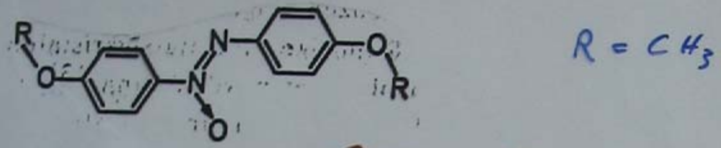


Fig. 39. Formation of a polymeric supramolecular species by association of two complementary ditopic components.

Flüssig Kristalle



R = CH_3

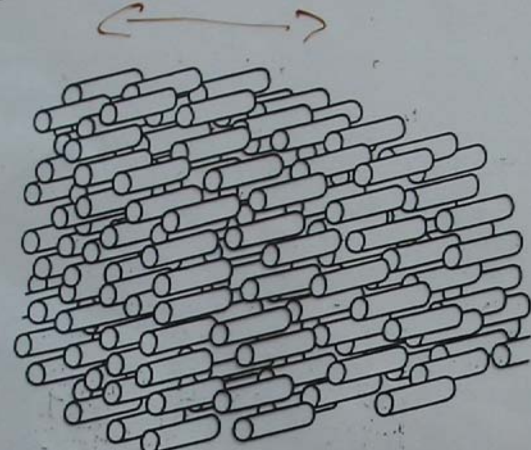


Abb.19. Phasenstruktur eines nematischen Flüssigkristalls

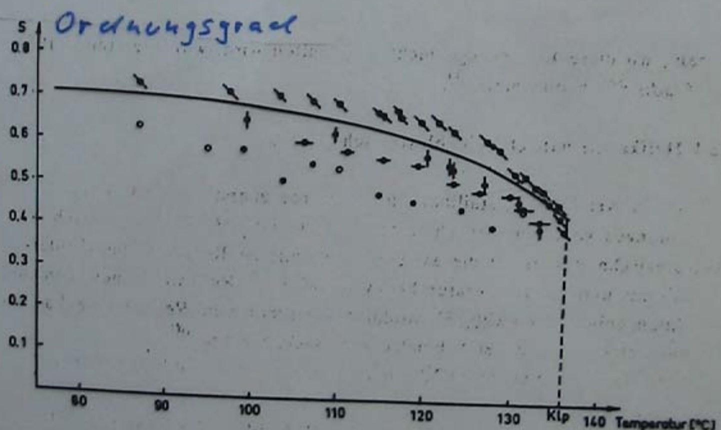


Abb.20. Ordnungsgrad S von 4,4'-Dimethoxyazoxybenzen (2a), bestimmt aus: • = IR-Spektren, o = UV-Spektren, ϕ = diamagn. Suszeptibilität, -o- = Brechungsindex bei 546 nm, ⊗ = Protonenresonanz. Die ausgezogene Kurve wurde nach der Theorie berechnet 42)

Chemisorption

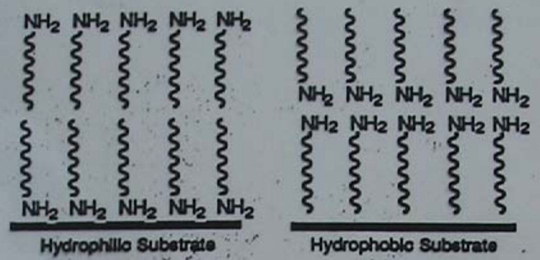
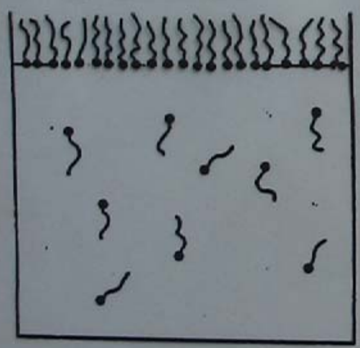


Figure 1.42. A tail-to-tail bilayer (left) and a head-to-head bilayer (right) of ODA.

Surfactant



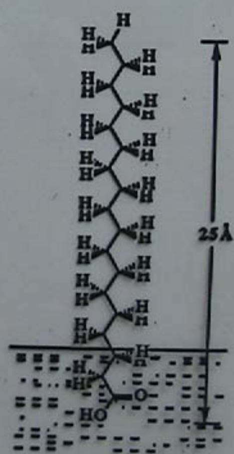


Figure 2.5. A stearic acid molecule on the water–air interface.

gold-Kolloid

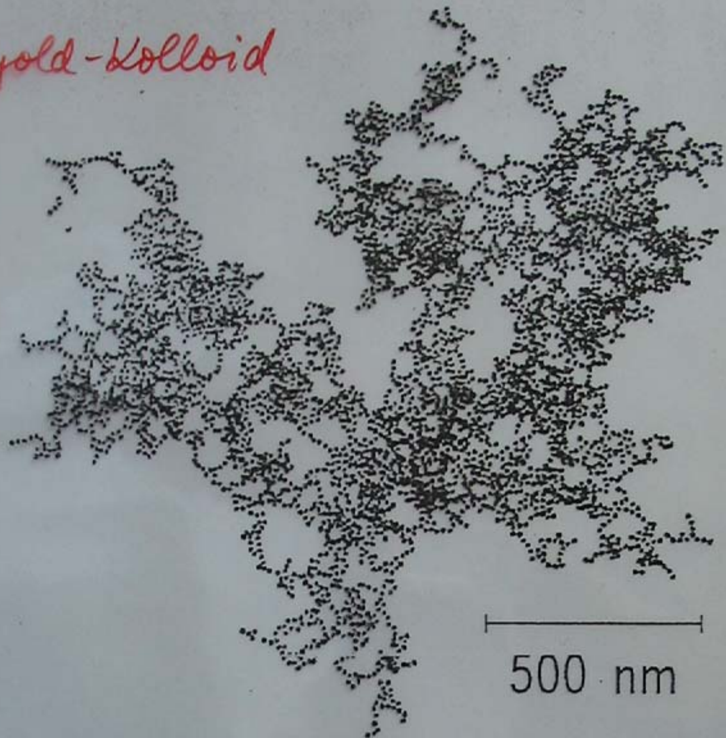


FIG. 7. The transmisssion electron microscope image of a gold colloidal aggregate (Weitz and Oliveria[21]).

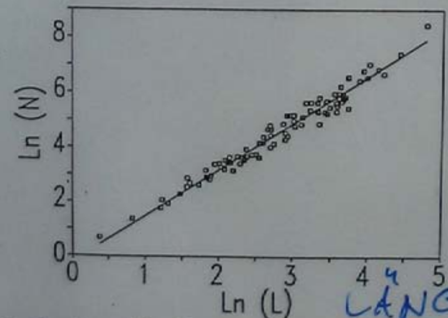


FIG. 8. The number of gold particles N plotted versus the length scale L of the colloidal aggregate in Fig. 1. The slope of the log–log plot gives the fractal dimension $d = 1.75$. The unit of L is 14.5 nm (Weitz and Oliveria[21]).

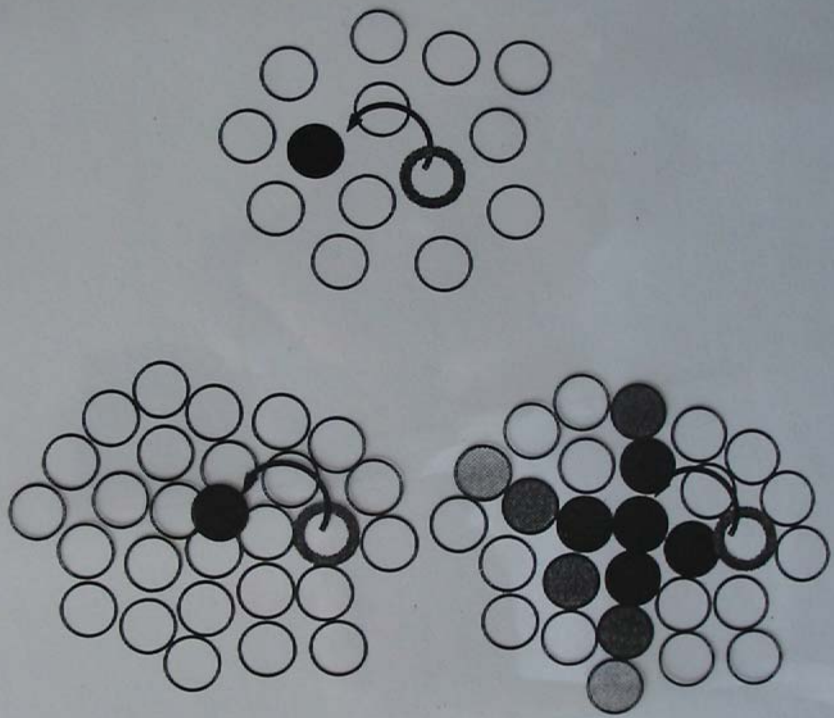


Fig. 2.13 The idea of cooperativity in diffusive motion of a molecule in a glass-forming liquid. At high temperatures and low densities (top) a molecule is able to jump to a new position without the necessity for wholesale rearrangement of its neighbours. At lower temperatures and higher densities (bottom), in order for one molecule to be able to make a move (left), some of its neighbours (shown shaded) must move cooperatively to make room (right).

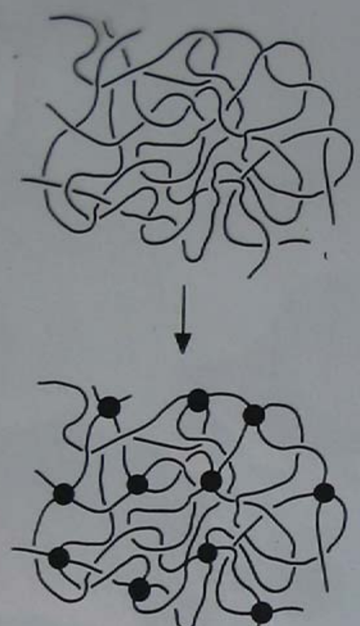


Fig. 6.2 Schematic of a vulcanisation reaction. The system consists of a mixture of long chains. Initially, the chains are entangled but not covalently linked. The reaction proceeds by chemically linking adjacent chains, leading to the formation of an infinite network.

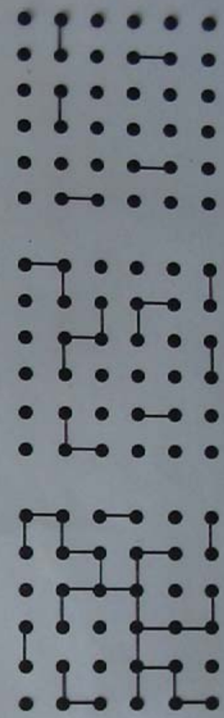
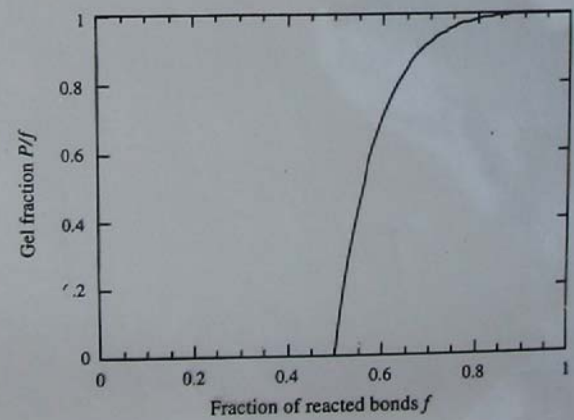


Fig. 6.6 The percolation model. We start with array of points, to which bonds are added at random (top). As more bonds are added, clusters of points are formed (middle), which ultimately join to form a cluster which spans the entire system (bottom).



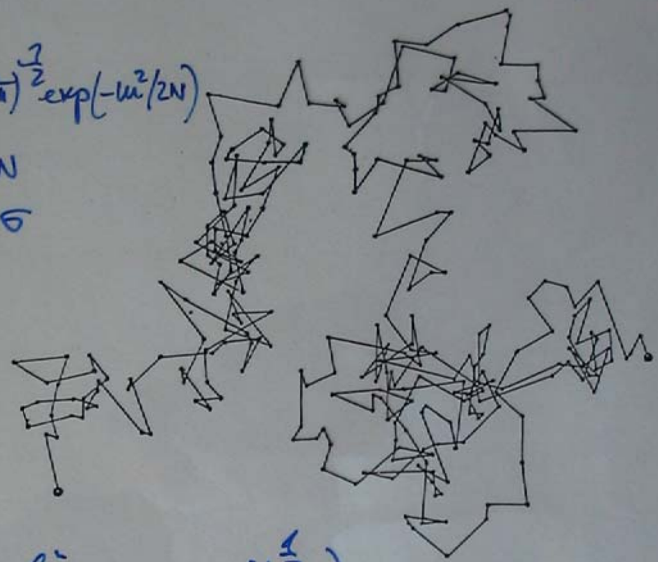
RANDOM WALK (Brownsche Bewegung)

$P(m,N) = (2\pi)^{-\frac{1}{2}} \exp(-m^2/2N)$

$N \to 4N$

$\sim \sigma \to 2\sigma$

$D = 2$



(Nettoweglänge $\sim N^{\frac{1}{2}}$)