Particle assisted wetting

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Wetting of a solid surface by a liquid is dramatically impeded, if either the solid or the liquid is decorated by particles.[1,2] Here we show that in the case of contact between two liquids the opposite effect can occur: mixtures of a hydrophobic liquid and suitable particles form wetting layers on a water surface though the liquid alone is non-wetting. In these wetting layers the particles adsorb to and partially penetrate through the liquid/air and/or the liquid/water interface. This formation of wetting layers can be explained by the reduction in total interfacial energy due to the replacement of part of the fluid/fluid interfaces by the particles.[3] Furthermore, one can observe wetting layers of a thickness considerably larger than the particle diameter.[4] This indicates that, in addition to their surfactant-like properties, particles adsorbed to an interface can compensate unfavourable long range interactions. Using magnetic particles this effect can be utilised to switch between wetting and dewetting by an external magnetic field.[5]