

Diffusion of nanoparticles from and across complex interfaces

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It has been recently shown that nanoparticles (NPs) can be used as adhesives for gels and biological tissues. This is based on the fact that the polymers in the gels are able to establish multiple interaction points with the nanoparticles [1]. Such adhesion principle was also successfully applied into wound closing and organ repair [2].

This project is divided into two parts. In the first part we will assess the diffusion of the nanoparticles from these complex interfaces, as a function of nanoparticle size and gel network mesh size. We will also check if the irreversible gel adhesion using nanoparticles is valid if the gels have different properties.

In the second part of this project we will assess the diffusion of other molecules across these complex and rough interfaces.

We will use experimental methods like fluorescent correlation spectroscopy, confocal microscopy and gel electrophoresis, as well as coarse-grained computer simulations.

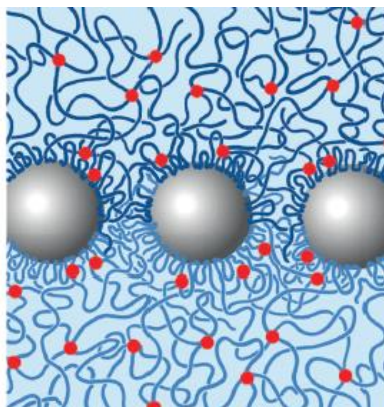


Figure 1. Gluing gels using nanoparticles. Network chains are adsorbed on nanoparticles through multiple anchor points that glue the particles to the gel network, and thus the two gels together. The nanoparticles and networks mesh have similar size. From ref. [1].

[1] S. Rose, A. Prevot, P. Elzière, D. Hourdet, A. Marcellan, L. Leibler, *Nature* 505 (2014) 382.

[2] A. Meddahi-Pellé, et al., *Angew. Chem. Int. Ed.* 53 (2014) 6369-6373.

Students that have worked or are currently working in this project:
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