Molecules move faster near sticky surfaces

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Molecules move faster as they get closer to adhesive surfaces, but this effect is not permanent. Such is the puzzling conclusion of a study published in *Physical Review Letters*, carried out by Simone Napolitano and his colleagues in the Laboratory of Polymers and Soft Matter Dynamics at the Université libre de Bruxelles.

Since more than 20 years, several researchers have been studying the behaviour of certain polymers, biomolecules, and liquid crystals at the nano-scale near an absorbing medium. In this case we would expect slower movement rates, but the experiments showed the opposite: molecules move faster as they get closer to an adhesive surface. According to the research team of ULB, this odd movement is due to a phenomenon known as the 'nanoconfinement effect': the molecules that are in direct contact with the adhesive surface do move slower, or even not at all, but this in turn increases the movement rate of the next molecules, as they have more free space around them.

Now, writing in PRL, Napolitano and coworkers show that this effect is only temporary: movement rate gradually slows down as new molecules adhere to the surface and fill in the spaces left. After a while, molecules move as if they were far from the adhesive surface. Importantly, the time necessary to return to normal molecular movement rate is longer than what would be predicted by any current theory of polymer physics.

As a result, the researchers propose that the amount of available space at the interface between polymer and sticky wall is an important parameter to control the behaviour of nanomaterials.

More information: Anna Panagopoulou et al. Irreversible Adsorption Governs the Equilibration of Thin Polymer Films, *Physical Review Letters* (2017). DOI: 10.1103/PhysRevLett.119.097801

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