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Cover Profile

Flexible NO_2-Functionalized N-Heterocyclic Carbene Monolayers on Au(111) Surface


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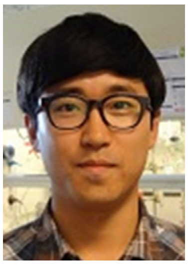
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Invited for the cover of this issue are Elad Gross, F. Dean Toste, and co-workers at The Hebrew University and UC Berkeley. The image depicts the flexible anchoring geometry of addressable carbene molecules on Au surface, which upon exposure to reducing conditions changed their orientation from a standing into a flat-lying position. Read the full text of the article at 10.1002/chem.201903434.

What is the most significant result of this study?

The discovery of flexible N-heterocyclic carbene (NHC) based monolayer in which a chemical trigger facilitates a change in the anchoring geometry of the surface-anchored molecules is of key importance for the development of flexible surfaces. In this work, we demonstrate that nitro-functionalized NHCs show structural flexibility and change their orientation from a perpendicular to a flat-lying position in response to a reducing environment that induced nitro-to-amine reduction. These results highlight the potential role of chemically active NHCs for tuning the electronic properties of various substrates.

What was the inspiration for this cover design?

To visualize the controlled flexibility of the surface-anchored molecules, we used the graphic idea of an industrial conveyor. In this cover image the NHCs-coated Au surfaces are transported to an oven, in which a short exposure to heat and molecular hydrogen modifies the NHCs orientation. With this illustration, we emphasize the simplicity and potential applicability of flexible self-assembled monolayers.

What other topics are you working on at the moment?

We mainly use the addressable NHCs as chemical markers for detecting differences in reactivity within single nanoparticles. Site-dependent changes in the chemical properties of surface-anchored NHCs are mapped by conducting IR nanospectroscopy measurements. Our surface-science analysis of the properties of addressable NHCs under various reactive conditions provides us with essential information about the reactivity, stability and anchoring geometry of NHCs. This knowledge is essential for synthesizing specifically designed NHCs that will function as chemical markers for surface-induced reactions on catalytic nanoparticles.