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**Radical Chemistry and Charge Manipulation with an Atomic Force Microscope**[1]

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The fuctionalization of tips by atomic manipulation dramatically increased the resolution of atomic force microscopy (AFM) [1]. The combination of high-resolution AFM with atomic manipulation now offers the unprecedented possibility to custom-design individual molecules by making and breaking bonds with the tip of the microscope and directly characterizing the products on the atomic scale. We recently applied this technique to generate and study reaction intermediates [2] and to investigate chemical reactions trigged by atomic manipulation. We formed diradicals by dissociating halogen atoms and then reversibly triggered ring-opening and -closing reactions via atomic manipulation, allowing us to switch and control the molecules reactivity, magnetic and optical properties [3]. Additional information about charge states [4] and charge distributions [5] can be obtained by Kelvin probe force spectroscopy. On multilayer insulating films we investigated single-electron attachment, detachment and transfer between individual molecules [6]. References: [1] L. Gross et al. Science 325, 1110 (2009) [2] N. Pavliek et al. Nature Chem. 7, 623 (2015) [3] B. Schuler et al. Nature Chem. 8, 220 (2016) [4] L. Gross et al. Science 324, 1428 (2009) [5] F. Mohn et al. Nature Nanotech. 7, 227 (2012) [6] W. Steurer et al. Nature Commun. 6, 8353 (2015)

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