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Single Molecules Investigated using atomically functionalized qPlus Sensors

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Single organic molecules were investigated using scanning tunnelling microscopy (STM), noncontact atomic force microscopy (NC-AFM), and Kelvin probe force microscopy (KPFM) employing a qPlus sensor [F. J. Giessibl, *Appl. Phys. Lett.* **73**, 3956 (1998)]. The resolution was increased due to tip functionalization by atomic manipulation. Using NC-AFM and CO functionalized tips, atomic resolution on molecules [L. Gross *et al. Science* **325**, 1110 (2009)] and molecular structure identification was demonstrated [L. Gross *et al. Nature Chem.* **2**, 821 (2010)]. Moreover, the bond orders of individual carbon-carbon bonds in polycyclic aromatic hydrocarbons and fullerenes were distinguished [L. Gross *et al. Science* **337**, 1326 (2012)]. Using Xe terminated tips the adsorption height and tilt of individual molecules was determined [B. Schuler *et al. PRL* **111**, 106103 (2013)]. With KPFM information about the intramolecular charge distribution was gained [F. Mohn *et al. Nature Nanotechnol.* **7**, 227 (2012)].