High-resolution AFM/STM/IETS imaging and its applications to molecular systems on surfaces.

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High-resolution AFM/STM/IETS imaging of molecules acquired functionalized tips [1] created a lot of excitement among researchers from many fields including material science, physics and chemistry. Here we will briefly describe a common underlying mechanism responsible for the unprecedented sub molecular contrast [2] including an efficient simulation approach of AFM/STM/IETS images. In next, we will also discuss applications of this technique to imaging electrostatic field of molecules [3] and weakly interacting water cluster with sub molecular resolution [4] or discrimination of molecular spin states [5].

[1] R. Temirov et al, New J. Phys. 10, 053012 (2008); L. Gross et al, Science 325, 1110 (2009); Ch. Chiang et al, Science 344, 885 (2014); P. Jelinek J. Phys. Cond. Matt 29, 166001 (2017).
[2] P. Hapala et al, Phys. Rev. B 90, 085421 (2014); P. Hapala et al, Phys. Rev. Lett. 113, 226101 (2016); B. de la Torre et al Phys. Rev. Lett. 119, 166001 (2017).
[3] P. Hapala et al, Nature Commun. 7, 11560 (2016).
[4] J. Peng et al Nature Commun. 9, 122 (2018).
[5] B. de la Torre et al, Nature Commun. 9, 2831 (2018).