1D constrained surface reactions on anisotropic Au(110)

Dingyong Zhong[1]

[1] *School of Physics and State Key Laboratory for Optoelectronic Materials and Technologies, Sun Yat-sen University, 510275 Guangzhou, China*
dyzhong@mail.sysu.edu.cn

Au(110) surfaces with missing-row reconstruction exhibit promising effect for on-surface chemical processes, due to the one dimensional (1D) geometric confinement. Linear alkane polymerization have been achieved on Au(110) surfaces through the terminal methyl C-H activation [1]. Compared with Pt(110), which has similar missing-row reconstruction, the Au(110) surface exhibits relatively weak interactions with dehydrogenated hydrocarbon species, suppressing C-C bond breaking and fragmentation [2]. Besides linear alkanes, the concept of "1D constrained surface reactions" can be extended to other molecular systems. C-H bond activation of oligophenylenes resulting in the preferential formation of linear polyphenyl wires over branched analogous has been demonstrated on Au(110) surfaces. Owing to the 1D spatial constraint, the equivalent C–H bonds of p-6P molecules are differentiated with various reaction probabilities. Consequently, linear polymerization of p-6P has been achieved via C–C bonding at the meta-sites, with the kink formation every 6 phenylene units (Fig. 1) [3]. Furthermore, the "1D constrained surface reactions" have been successfully applied for the decarboxylation of linear fatty acids, resulting in the polymerization at their terminal ends and the formation of oxygen-free aliphatic hydrocarbons at mild temperatures. The 1D constrained surface reactions beyond Au(110) surfaces will also be discussed in this talk [4].

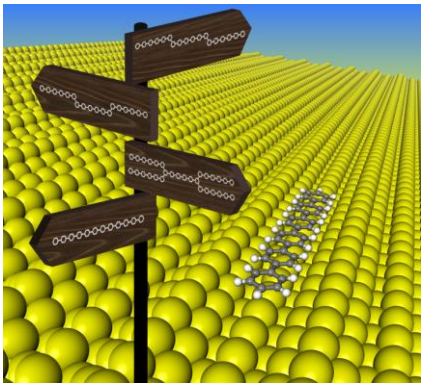

Fig. 1 Controllable fabrication of linear polyphenyl wires by direct C–H activation and C–C coupling of para-sexiphenyl (*p*-6P) has been achieved on an anisotropic Au(110) surface. Owing to the one-dimensional spatial constraint at the surface, the equivalent C–H bonds of *p*-6P molecules are differentiated with various reaction probabilities.

References:
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[4] M. Z. Liu et al., Nat. Commun. **8**, 14924 (2017).