On surface dynamic covalent chemistry

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The formation of molecular nanostructures with concomitant patterns and functions is of utmost importance in the field of surface molecular engineering and nanotechnology. With the carefully design peripheral functional groups to facilitate intermolecular interactions, the sophisticated structures with ordered pattern on solid supports can be tailored. Recently, great attention has been paid to the on-surface synthesis of molecular nanostructures. The reaction process and mechanism of a number of reactions, such as Ullmann reaction, Glaser coupling, have been extensively studied. Dynamic covalent chemistry a synthetic strategy makes complex supramolecular assemblies from discrete molecular building blocks. The most notable feature of dynamics covalent reaction is the reversibility, which allows the formation of thermodyamically favored products.

In this presentation, we will discuss the bottom up fabrication of highly ordered 2D networks on single crystalline solid supports using dynamic covalent chemistry. We demonstrate the construction of well-ordered 2D covalent networks via the dehydration of di-borate aromatic molecules via the chemical equilibrium regulation. By introducing small amount of water into a closed reaction system, the chemical equilibrium of boroxine ring formation reaction can be regulated to favor the occurrence of reverse reaction and therefore improves the abilities of the self-adjustment or self-healing of the sCOFs. Further extension of this strategy to other kinds of chemical reactions to fabricate 2D covalent-bonded nanostructures will be also discussed.

References:

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