Exploration of Crystalline 2D Conjugated Organic Polymers

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Covalent Organic Polymers (COPs) belong to an intriguing and young class of porous materials which promise great potential for a wide range of applications such as gas adsorption, optoelectronics, catalysis, separation and energy conversion / storage.[1-4] However, attending the chemical stability and/or crystallinity in these materials still remain a key challenge, which is necessary for many potential applications.[2-6] Nevertheless, a lack of understanding, unclear formation mechanism and undeveloped methodologies of this intriguing class of conjugated crystalline polymers hampers more work and demand prompt attention.[7-9]

Only recently, we reported the first example of an entirely sp2-carbon-conjugated two-dimensional polymer synthesized by Knoevenagel polymerisation.[4] C=C renders high chemical and thermal stabilities. To enhance stability toward versatile COPs, Aryl-aryl bonds are desirable. Thiazolothiazole (TzTz) linkages were studied systematically and three novel, thermos-chemically stable TzTz-linked POPs are presented.
The synthesis of crystalline TzTz-linked Polymers is under investigation.

References

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Figures

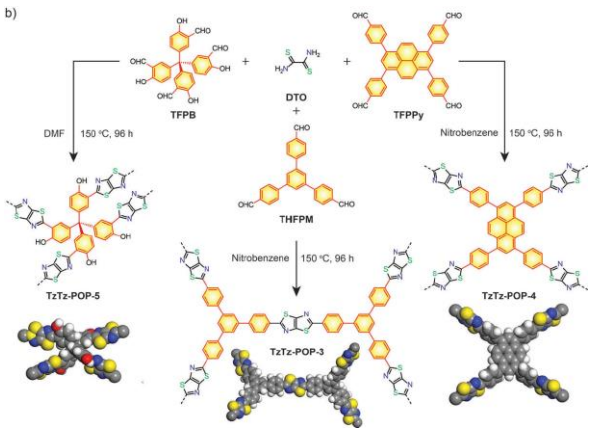

Figure 2: Synthesis route of TzTz linked POPs from different symmetrical arylaldehydes and dithiooxamide (DTO, spacefilling model of optimized fragments of TzTz-POP-3, -4 and -5 created using Materials Studio version 2017, resented at the bottom to represent the local structure of TzTz-POPs).