Soft Layered Conjugated Polymers for Advanced Sensing

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Two-dimensional (2D) nanostructures have attracted much interest in recent years. Our group has focused on structures and functions of soft layered materials.[1] Compared with the conventional rigid layered compounds, soft layered materials have potentials for the molecular motions exhibiting dynamic functions. For example, the soft layered composites are efficiently exfoliated into the nanosheets.[2] The designed organic layered materials are synthesized and applied to energy-related devices.[3,4] Here I focus on a soft layered material based on conjugated polymers, layered polydiacetylene (PDA), exhibiting the structure flexibility and dynamic properties (Figure 1).[1,5-15] PDA shows blue-to-red color changes with the application of external stimuli through shortening the effective conjugation length with the motion of the layered structures. The dynamic color-change properties, *i.e.* the responsivity, are controlled by the intercalated guests. The responsivity control is achieved by the integration of stimuli-responsive materials. A variety of external stimuli, such as heat,[5–9] light,[10] and force,[11–15] are visualized and quantified using the soft layered conjugated polymers. The sensors can be applied in the field of clinical medicine.[9,12,15]

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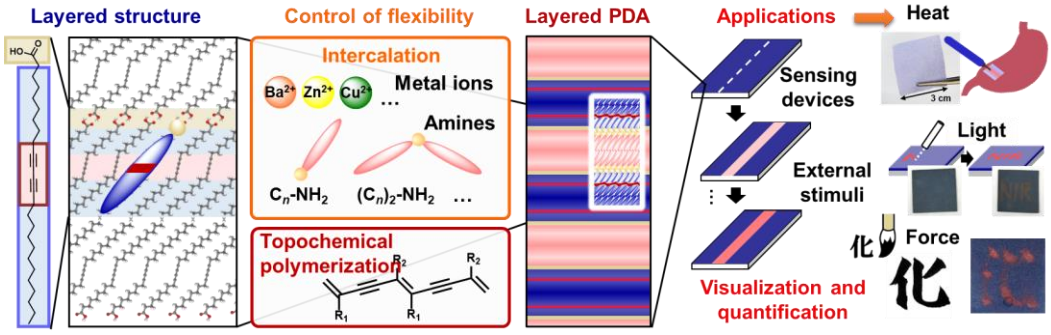

Figure 1: Schematic illustrations of layered polydiacetylenes (PDAs) and their advanced sensing applications.