

Molecular switch embedded multifunctional polymer devices

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In this talk, I introduce various strategies to embed molecular switch into organic electronics to realize highly integrated, multifunctional devices. Typically, diarylethene derivatives are known as a wavelength-selective molecular switch such that UV light (300–400 nm) induces photocyclization (open to close) and visible light (400–600 nm) induces photocycloreversion (close to open). Rather, in this work, we utilize light intensity dependent switching properties of diarylethene such that gradually stronger light intensity of sun light (including both UV and visible wavelength) gradually converts open isomer to closed isomer. This is due to 10–100 times higher quantum yield of photocyclization than that of photocycloreversion of common diarylethene. It is known that first photoexcited state of closed isomer has certain activation energy barrier which hinders the cycloreversion, whereas cyclization has barrierless transition from open to closed ring isomer. With these considerations, I apply strategically designed/synthesized DAEs to transistors, photodiodes and photonic memristors.