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A Photoswitchable colorimetric sensor for fluoride based on dithienylethene unit

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The design and synthesis of novel anion receptors capable of sensing anions selectively have attracted increasing attention due to the important role of anions. Recently, many photoswitchable cation receptors with the dithienylethene bolck linked with metal ion recognition units have been designed and synthesized. By contrast, the photoswitchable anion receptors based on dithienylathene unit has been rarely reported. Herein, a novel DTE-amide based photoswitchable anion receptor 1 was synthesized by condensation of a 4, 4'-(cyclopent-1-ene-1, 2-diyl)bis(5-methylthiophene-2-carboxylic acid) with 4-nitroaniline with 56% yield under mild conditions. And its structure was well-confirmed by NMR, MS and elemental analysis. Investigation on photochromic properties indicated that compound 1 had good reversibility and excellent fatigue resistance upon irradiation with UV or visible light. Moreover, For receptor 1 in DMSO, the addition of fluoride resulted in colorless-to-yellow absorption color change by extending the conjugated system of the receptor anion, which was formed only when complexed with a fluoride ion. Moreover, It can be served as a potential photoswitchable colorimetric fluoride sensor.

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