

## Synthesis and Solid State Optical Properties of 2,5-Di(1,3-dithiol-2-ylidene)-1,3-dithiolane-4-thione Derivatives with Various Acceptor Moieties

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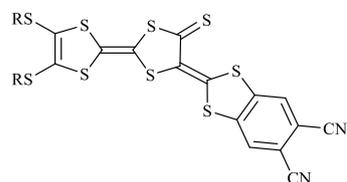
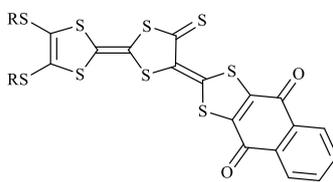
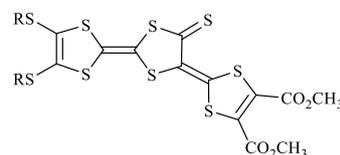
**Keywords:** Redox, Near-infrared Absorption, Solid State, Acceptor

Tuning of solid state colors of redox active molecules is one of the current issues for an application of functional dyes to the light absorbing system. Through the investigation of the optical properties of phthalonitrile fused 2,5-di(1,3-dithiol-2-ylidene)-1,3-dithiolane-4-thione derivatives, we found that the magnitude of near-infrared (NIR) absorbance was controlled by the size of alkyl substituents but the absorption region was not enhanced. In order to enhance absorption region and absorbance in solution and in solid state, we introduced various acceptor moieties to a 2,5-di(1,3-dithiol-2-ylidene)-1,3-dithiolane-4-thione framework and investigate their optical properties.

All derivatives were synthesized by the reaction of the corresponding tetrathiafulvalene dithiolates and the corresponding ylium salts in good yields.

In diluted solution all derivatives show two strong absorption maxima around 600 nm and 450 nm.

In solid state all derivative absorbs both visible light and NIR light. Derivatives **1** and **2** have the absorption edge around 1500 nm and 1900 nm, respectively. This results reveals that the introduction of naphthoquinone enhanced the absorption edge in NIR region. The magnitude of NIR-light-region-absorbance of the derivative **1** is 80% of the magnitude of visible-light-region-absorbance. On the other hand, the magnitude of NIR-light-region-absorbance of the derivative **2** is 20% of the magnitude of visible-light-region-absorbance. This ratio is quite smaller than the ratio of the derivative **1**. The detail of solid state absorption spectra of all derivatives will be discussed.

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