Cyclobutenedione and Benzocyclobutenedione Based Molecular Materials: Fluorene Fused Benzoquinones and Acenes

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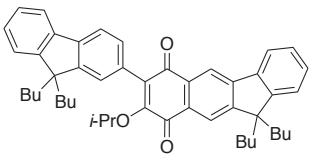
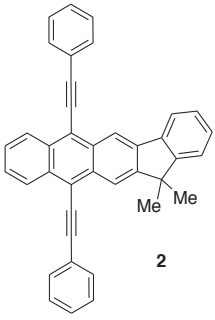
In this study, firstly, the thermal rearrangement of 4-fluorenyl-4-hydroxycyclobutenones to fluorene annelated benzoquinone derivatives was described. The reaction of diisopropyl squarate (3,4-diisopropoxy-3-cyclobutene-1,2-dione) and a fluorenyl substituted cyclobutene-dione [3-(9,9-dibutyl-fluoren-2-yl)-4-isopropoxy-3-cyclobutene-1,2-dione] with 2-lithio-9,9-dibutyl-fluorene gave 4-fluorenyl-4-hydroxycyclobutenone derivatives which were heated in *p*-xylene at reflux open to the air to yield quinones such as **1**. Structural complexity of the benzoquinone derivatives was increased by employing 2,7-dilithio-9,9-dibutyl-fluorene. These quinones have potential usage as redox-fluorescence switches since it is expected that the electrochemical reduction of the quinone units provides an increase in fluorescence intensities [1]. Similarly, the thermal rearrangement of 2-fluorenyl-2-hydroxybenzocyclobutenone to fluorene annelated naphthaquinone derivatives –acene quinones– was also described. The reaction of benzocyclobutenedione with 2-lithio-9,9-dibutyl-fluorene and 2-lithio-9,9-dimethyl-fluorene gave 2-fluorenyl-2-hydroxybenzocyclobutenone derivatives which were heated in *p*-xylene at reflux open to the air to achive acene quinones. After then, acene quinones were reacted with various organolithium reagents to produce intermediates involving dihydroxyl groups. These intermediates were further reacted with a reducing agent to obtain differently substituted highly fluorescent acenes such as **2**. Acenes constitute an important place as excellent electron transport materials in organic electronic devices, particularly, in organic thin film transistors (OTFTs) [2]. In this study, the prepared acene structures are highly soluble in common organic solvents because of alkyl chains on the cyclopentane ring in the main skeleton. Additionally, they are stable at room temperature in the presence of air and water.



1



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