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PHOTOCHEMICAL APPROACH TO THE SYNTHESIS OF NAPHTHALENE CONTAINING LARIAT-TYPE CROWN ETHERS AND AN EVALUATION OF THEIR METAL CATION BINDING AND FLUORESCENCE SENSING PROPERTIES

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A novel method has been developed for the synthesis of naphthalene chromophore containing, lariat-type crown ethers. The route employs SET-promoted photocyclization reactions of polyether-tethered 2,3-naphthalimides to generate the variously ring-sized crown ether cores and an allylsilane N-acyliminum ion addition process to install amino ether side chains. The metal cation binding properties of the lariat crown ethers, prepared in this manner, were evaluated. In addition, the ability of the lariat crown ethers to serve as SET-based, fluorescence sensors of metal cations was probed. The results show that although thenovel lariat-crown ethers strongly complex alkali metal cations (Na, K, Rb, Cs), this complexation is not associated with enhanced fluorescence from the naphthalene chromophores as would be expected if cation binding impeded SET quenching by the tertiary amine donor in the side chains. In contrast, the novel lariat crown ethers serve as sensitive sensors for the divalent metal cations of Mg and Cu and the monovalent cation of Ag. Details of this investigation will be presented.