

Novel Piezochromic Materials for NASA Pressure Systems

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High-risk pressurized systems are routinely used for ground-based and in-flight operations in all NASA testing/research facilities. As of 2024, there are approximately 10,000 ground-based pressure vessels and systems (PVS). While use of these pressure systems is imperative for NASA operations, they pose an immense safety risk if not operated or maintained properly. Two novel pyrylogen ditosylate salts will be synthesized, characterized, and pressurized for its application as a simple pressure sensor for NASA operations. The salts were characterized by ^1H and ^{13}C NMR spectra and elemental analysis for their purity. The UV-Vis absorption and emission/excitation fluorescence spectra of the salts were recorded in methanol and acetonitrile by a UV-Vis spectrometer and fluorometer, respectively. Compared to non-fused pyrylogen ditosylates, the incorporation of a fused-ring system increases their solution-state photoluminescence by almost 40% in methanol. Their piezochromic properties were also investigated. Future work will focus on designing task-specific pyrylogen salts by fine-tuning substituents on the aromatic framework to manipulate the electronic structure.