

TTF-PHENANTHROLINE: A NOVEL LIGAND DESIGNED TO PRODUCE MULTIFUNCTIONAL LIGHT-HARVESTING RU(II) COMPLEXES Lawrence K. Keniley Jr.^a, Jie Ding^b, Lipika Ray^a, Kirill Kovnir^a, Andreas Hauser^b, Michael Shatruk^a

^a *Department of Chemistry & Biochemistry, Florida State University, 95 Chieftan Way, Tallahassee, FL 32306, United States*

^b *Department of Physical Chemistry, University of Geneva - Sciences II, 30, Quai Ernest-Ansermet, CH-1211 Geneva 4, Switzerland E-mail: lkeniley@chem.fsu.edu, shatruk@chem.fsu.edu*

Recently, we have reported a convenient synthesis of tetrathiafulvalene-annulated phenanthroline (TTF-phen), which can serve as a promising ligand for the development of multifunctional transition metal complexes. This redox-active molecule has been used to prepare a Ru^{II} complex whose crystal structure shows a unique 1D stacking of TTF fragments. Comparing the photophysics of [Ru(bpy)₂(TTF-phen)](PF₆)₂ and [Ru(bpy)₃](PF₆)₂ in an acetonitrile solution, we have observed a red shift of the emission maximum (640 nm vs. 607 nm) and a decreased quantum yield (1.2% vs. 6.2%), explained by a partial luminescence quenching owing to the presence of the TTF donor fragment. The luminescence lifetime, on the other hand, is increased (1.77(1) μs vs. 855(1) ns) due to a more efficient charge separation in the excited state. [Ru(bpy)₂(TTF-phen)](PF₆)₂ exhibits two reversible oxidations, which are shifted to slightly higher potentials than those observed for TTF-phen. The complex remains indefinitely stable in the solid state, but exhibits an unexpected light-induced oxidative cleavage of the central C=C bond of the TTF unit in solution.