## Title: Fc-Fc Equatorial Electronic Communication Through Diruthenium Paddlewheel Complexes

Authors: <u>Darryl A. Boyd</u> (daboyd@purdue.edu), Zhi Cao, Phillip E. Fanwick, You Song, Tong Ren\*

## Purdue University

Due to their prominent redox flexibilities, diruthenium paddlewheel complexes can be used to modulate electronic charge. The parent diruthenium paddlewheel compounds,  $Ru_2(D(3,5-Cl_2Ph)F)_{4-n}(OAc)_nCl [n = 1 (1a) and 2 (2a)], where D(3,5-Cl_2Ph)F is the$ ligand N,N'-di(3, 5-dichlorophenyl)formamidinate, were used to synthesize the complexes  $Ru_2(D(3,5-Cl_2Ph)F)_{4-n}(O_2CFc)_nCl [n = 1 (3a) and 2 (4a)]$ , which were bound equatorially by bidentate ferrocene carboxylate ligands. Analogous complexes were synthesized from the parent diruthenium compounds,  $Ru_2(DmAniF)_{4-n}(OAc)_nCl [n = 1]$ (1b) and 2 (2b)], where DmAniF is the ligand N,N'-di(3-methoxyphenyl) formamidinate. The equatorially bound acetate ligands were displaced by ferrocene carboxylate ligands to vield  $Ru_2(DmAniF)_{4-n}(O_2CFc)_nCl [n = 1 (3b) and 2 (4b)]$ . Compounds (4a) and (4b), synthesized by treatment of each compound with two equivalents of ferrocene carboxylate ligand, yield interesting voltammetric and spectroscopic profiles. Both (4a) and (4b) were oxidized and the Fc---Fc<sup>+</sup> IVCT bands in the resultant cations were investigated. The data obtained indicate that electronic communication occurs between the two ferrocene centers in each oxidized bis-substituted compound. Electronic calculations were conducted for (4a), confirming the possibility of electronic communication between the ferrocene metal centers of the oxidized species.