研究工作詳述

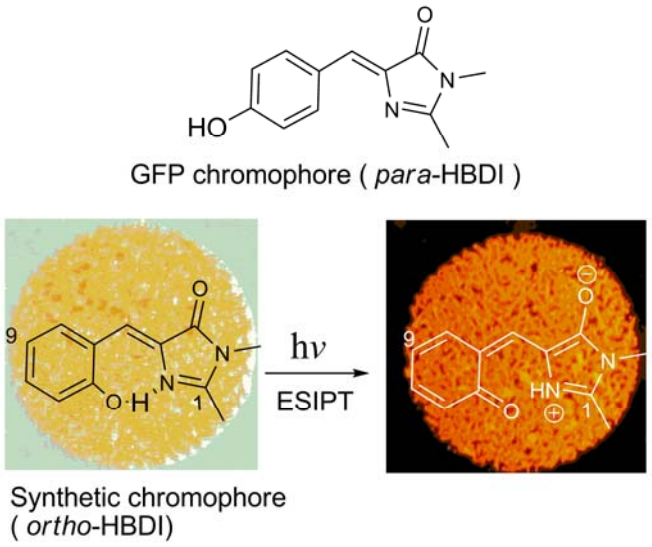
立基在光物理以及分子結構的相關性原理上, 我們最近已經由設計與合成，在一些嶄新的電子及質子轉移化合物上大放異彩 。首先, 我們根據 HOMO-LUMO 電子轉移的基礎架構, 設計出了全世界第一個類螢光蛋白官能基的發光團.。 不同於光蛋白發色團需要 3 度空間(3-dimentional), 鋼硬構體 (rigidity)以及水分子及胺基酸的正確排列才能進行電子轉移激發質子轉移, 此 ortho-異構物藉由本身的七元環內氫鍵即能進行電子轉移感應質子轉移的反應。我們進而用 fluorescence up-conversion 以及 transient absorption 加上 deuterium isotope effect, 結論出激發態質子轉移是沒有能障限制, 甚至是一個 coherent motion. 目前的進度是藉由各種化學修飾可以微調波長下, 其一系列衍生物的基礎及應用研究將是無遠弗屆。另外也是藉由化學設計及合成原理, 我們已經發展出一系列的電子/質子轉移偶合新化合物, 且致力於其基礎反應動力學以及應用上的研究。在基礎的研究上我們已經經由強耦合以及若耦合的理論基礎來闡釋各種不同的實驗結果, 並試圖讓我們的結果能以一統化的理論來歸納。這部份的成果也相當的傑出。日前已經獲 Acc. Chem. Res.的邀稿在寫一個相關的 review 論文。在應用方面我們也藉由電子/質子轉移的概念成功的在雷射染料, 有機發光元件以及太陽能電池的修飾上有相當傑出的成果。我們對於耦合機制瓶頸克服之道已設計出一系列新的化合物, 其發展非常的順遂, 但這些系統目前尚未達到最適切(optimized)的境界。我們的下一個目標是設計一個全新的系統, 使 其在第一激發態沒有任何激發態電子轉移的發生, 而是在質子轉移後伴隨電子轉移的反應. 目前的進展相當順利, 應在半年之內有所突破。據此, 我們深具信心可以進一步、更透徹的來了解激發態電子及質子轉移的機制。子計劃裏我們提出並在這一年已經以合成方式設計出不同架橋所連結的雙色團、甚至多重色團來研究激發態電子轉移的有效機制。我們的遠程目標: 雙色團架構配以不同長度，構型的架橋，甚至利用氫鍵的多樣化(flexibility and versatility)來研究電子轉移的適合參數, 目前正在進行中。我們希冀能夠設計多重色團, 經由不同架橋的組合達到設計分子導線甚至光致電元件的最佳組合。我們也將在新的實驗中以飛秒雷射結合螢光合頻以及瞬態吸收光譜技術來做緩解動力學，再用 IR 偵測系統來探測其所伴隨的結構變化。我們在這方面相關系統的設置

已頗具規模，未來相信可以接受整合計畫相關的更高困難實驗挑戰。

受限於 space, 我們在這只列三個成果實例。如果有興趣了解更多的 details 請參閱我們所列的 references 中所打星號部份。

執行成果

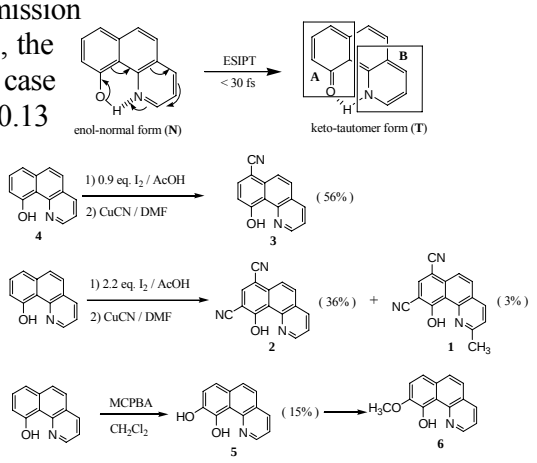
A. ortho-GFP Synthetic Chromophore; Excited State Intramolecular Proton Transfer via a Seven-membered Ring Hydrogen Bonding System

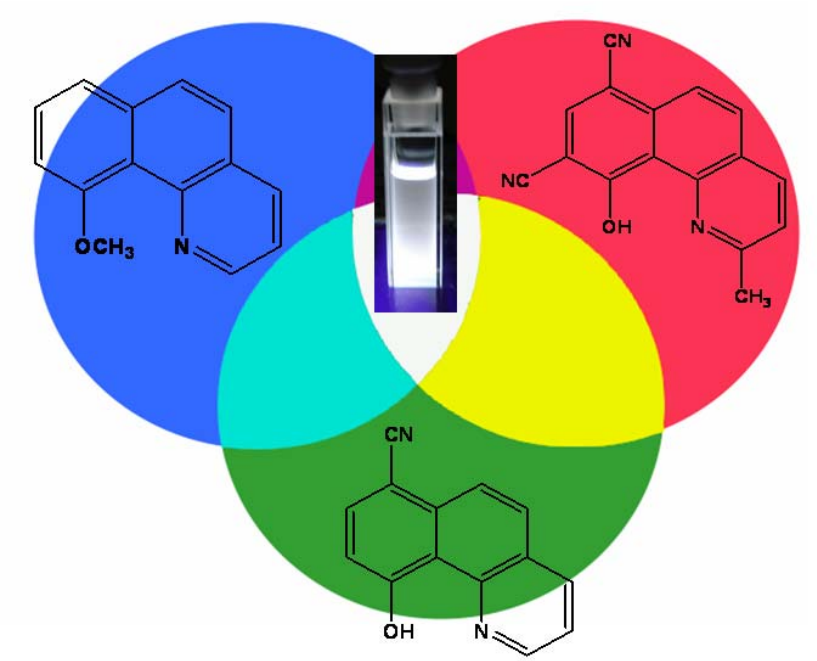


In this study, a structural isomer of the core emission chromophore 4-(4-hydroxybenzylidene)-1,2 dimethyl-1H-imidazol-5(4H)-one (para-HBDI) in green fluorescence protein (GFP), namely ortho-HBDI, has been synthesized. ortho-HBDI possesses a seven-membered ring hydrogen bond, from which the excited-state intramolecular proton transfer (ESIPT) takes place, resulting in a remarkable proton transfer tautomer emission of ~ 605 nm in organic solvents. Both deuterium isotope experiments and theoretical approaches point to an essentially barrierless potential energy surface along the ESIPT reaction. ESIPT also takes place in the solid film of ortho-HBDI, resulting in a ~ 595 nm tautomer emission with a quantum yield as high as 0.4. In sharp contrast, unless in the presence of GFP under a hydrogen-bond network, the GFP free para-HBDI gives nearly no emission in both solution and solid. While the bioactivity of ortho-HBDI is pending further exploration, its future chemical derivation is versatile. In an ongoing project, via the functionalization at C(1) and C(9) positions, the proton-transfer emission can be tuned to a broad range from green to deep red with high emission efficiency in solid film, generating a new series of isomers of para-HBDI with remarkable excited state intramolecular proton transfer properties.

B. Extensive spectral tuning of the proton transfer emission from 550 to 675 nm via a rational derivatization of 10-hydroxybenzo[h]- quinoline.

In this study, on the basis of a ESIPT system HBQ, we have systematically synthesized a new series of derivatives, such that the proton-transfer emission can be extensively tuned from 550 nm (**1**) to ~680 nm (**6**), the emission yield of which obeys the energy gap law. For the case of **1**-**3**, the emission quantum yield was measured to be > 0.13 in ethyl acetate, and ASE was readily observed, generating a new family of proton transfer fluorescence dyes. Future applications of this series of ESIPT moleucles can be greatly expanded. For example, via mixing e.g. **1** (λ_{em}~550 nm), **3** (λ_{em}~605 nm) and the methoxylated derivative of **4,** in which ESIPT is prohibited (emisison λ_{max}~ 420 nm, Φ ~ 0.3 in ethyl acetate),[14] a qualitative white light generation can be achieved with a regular UV lamp (366 nm).

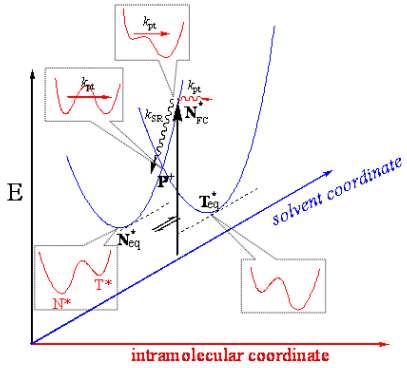


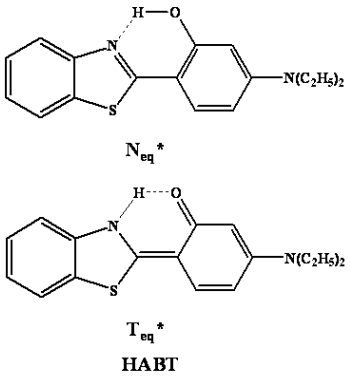


Via mixing compounds 1, 3 and 4a, a qualitative white light generation can be achieved in ethyl acetate with a regular UV lamp (366 nm)

C. Spectroscopy and Femtosecond Dynamics on 2-(2'-Hydroxy-4'-diethylaminophenyl)benzothiazole; The Role of Solvent Polarity in the Excited-State Proton Transfer Reaction

Detailed insights into the excited state enol (N*)-keto(T*) intramolecular proton transfer (ESIPT) reaction in 2-(2'-hydroxy-4'-diethylaminophenyl)benzothiazole (**HABT**) have been investigated via steady state and femtosecond fluorescence up-conversion approaches. In cyclohexane, in contrast to the ultrafast rate of ESIPT for the parent 2-(2'-hydroxyphenyl) benzothiazole ($>2.9 \pm 0.3 \times 10^{13}$ s^{-1}), **HABT** undergoes a relatively slow rate ($\sim 5.4 \pm 0.5 \times 10^{11}$ s^{-1}) of ESIPT. In polar, aprotic solvents competitive rate of proton transfer and rate of solvent relaxation were resolved in the early dynamics. After reaching the solvation equilibrium in the normal excited state (N_{eq}*), ESIPT takes place with an appreciable barrier. The results also show N_{eq}*(enol) $\leftrightarrow$ T_{eq}*(keto) equilibrium, which shifts toward N_{eq}* as the solvent polarity increases. Temperature dependent relaxation dynamics further resolved a solvent induced barrier of 2.12 kcal/mol for the forward reaction in CH_2Cl_2. The observed spectroscopy and dynamics are rationalized by a significant difference in dipole moment between N_{eq}* and T_{eq}*, while the dipolar vector for the enol form in the ground state (N) is in between that of N_{eq}* and T_{eq}*. Upon N $\rightarrow$ N* Franck Condon excitation, ESIPT is energetically favorable, and its rate is competitive with the solvation relaxation process. Upon reaching equilibrium configurations N_{eq}* and T_{eq}*, forward and/or backward ESIPT takes place with an appreciable solvent polarity induced barrier due to differences in polarization equilibrium between N_{eq}* and T_{eq}*.





HABT

四. 已發表之著作 (2006-2007 April), 星號代表相關於本計劃之論文

195 "Electrically Controllable Polarized Emission from CdS Nanorods for Smart Optoelectronic Devices" Kuan Ju Wu, Kung Ching Chu, Chih Yu Chao, and Yang Fang Chen, Chih-Wei, Lai, Chia-Cheng, Kang and Pi-Tai Chou, ***Appl. Phys. Lett.*** **2007**, *accepted*.

194 * "Excited-State Double Proton Transfer: The Concerted (Homodimer) versus Stepwise (Heterodimer) Reaction on the 7-Azaindole Analogues" Wan-Ting Hsieh, Cheng-Chih Hsieh, Chin-Hung Lai, Yi-Ming Cheng,a Mei-Lin Ho, Kung K. Wang, and Pi-Tai Chou*, ***J. Am. Chem. Soc.***, *in revision*.

193 "Pyreno[2,1-b]pyrrole and Bis(pyreno[2,1-b]pyrrole) as Selective Chemosensors of Fluoride Ion: A Mechanistic Study" Chia-I Lin, Srinivasan Selvi, Jim-Min Fang,* Pi-Tai Chou,* Chin-Hung Lai, and Yi-Ming Cheng, " ***J. Org. Chem.*** **2007**, 72(9); 3537-3542 **(3.7)**

192 * "ortho-GFP Synthetic Chromophore; Excited State Intramolecular Proton Transfer via a Seven-membered Ring Hydrogen Bonding System" Kew-Yu Chen, Yi-Ming Cheng, Cheng- Hsuan Lai, Cheng-Chih Hsu, Mei-Lin, Ho, Gene-Hsiang Lee, Pi-Tai Chou*, ***J. Am. Chem. Soc***. **2007**, *129(15),* 4534-4535 **(7.4)**

191 "Blue-Emitting Heteroleptic Iridium(III) Complexes Suited for High Efficiency Phosphorescent OLEDs" Cheng-Han Yang,Yi-Ming Cheng, Yun Chi,* Chia-Jung Hsu, Fu-Chuan Fang, Pi-Tai Chou,* Ming-Han Tsai, Chung-Chih Wu*" ***Angew. Chem. Int. Ed.*** **2007**, *46*, 2418-2421. **(9.6)**

190 "2,3-Disubstituted Thiophene Based Organic Dyes for Solar Cells" K. R. Justin Thomas, Ying-Chan Hsu, Jiann T. Lin,* Kun-Mu Lee, Kuo-Chuan Ho,* Chin-Hung Lai, Yi-Ming Cheng and Pi-Tai Chou* ***Adv. Funct. Mater.*** *accepted*. **(6.7)**

189 "Synthesis, structure and electroluminescent properties of cyclometalated iridium

complexes possessing sterically hindered ligands" Marappan Velusamy,a K. R. Justin Thomas, Chih-Hsin Chen,a Jiann T. Lin,* Yuh S. Wen, Wan-Ting Hsieh, Chin-Hung Lai, and Pi-Tai Chou*, ***J. Chem. Soc. Dalton Trans.,*** *accepted* **(3.0)**

188 * The Transnitrosation Reactions between MeXNO and MeY- (X= S, Se; Y= S, Se) Chin-Hung Lai, Pi-Tai Chou* ***J. Compt. Chem.*** **2007,** *accepted.* **(3.8)**

187 "A New Family of Ruthenium-Dyes Sensitized Nanocrystalline TiO_2 Solar Cell with a High Solar-Energy Conversion Efficiency" Kung-Shih Chen, Wei-Hsin Liu, Yu-Hsiu Wang, Chin-Hung Lai, Pi-Tai Chou,* Gene-Hsiang Lee, Kellen Chen, Hsing-Yi Chen, Yun Chi,* ***Adv. Funct. Mater.*** *accepted.* **(6.7)**

186 * "Isomerization Reactions of RSNO (R=H, C_nH2n+1 n≤ 4)" Chin-Hung Lai, Elise Y. Li, Pi-Tai Chou, ***Theor. Chem. Account.*** **2007**, *117*, 145–152. **(2.2)**

185 "Contemporary Progresses on Neutral, Highly Emissive Os(II) and Ru(II) Complexes"Yun Chi and Pi-Tai Chou, ***Chem. Soc. Reviews*** **2007**, *accepted.* **(13.7)**

184 "Surfactant Fine-tuning Self-Bundled CdS Nanorods versus Multi-Segment CdS Nanowires in the Absence of an External Electric Field" Chia-Cheng Kang, Chih-Wei Lai, Jing-Jong Shyue, Pi-Tai Chou*, ***Langmuir.*** **2006**, *accepted*. **(3.7)**

183 "Probing Pb^{2+} Cation via the Iridium Phosphorescence Dye" Mei-Lin Ho, Yi-Ming Cheng, Lai-Chin Wu, Pi-Tai Chou,* Fang-Chi Hsu, Yun Chi,* and Gene-Hsiang Lee, ***Org. Biomol. Chem.*****. 2007**, *accepted*. * **(2.6)**

182 * "7-Azamelatonin; Synthesis, Photophysical and Biochemical Properties" Pei-Wen Wu,a Yi-Ming Cheng, Wan-Ting Hsieh, Pi-Tai Chou,* Ching-Yen Wei ***ChemMedChem*****. 2006**, *accepted.* **(3.9)**

181 "Can an OH radical form a strong hydrogen bond? A theoretical comparison with H_2O" Chin-Hung Lai, Pi-Tai Chou, ***J. Compt. Chem.*** **2007**, *accepted*. **(3.8)**

180 "Color Tuning Associated with the Heteroleptic Cyclometalated Ir(III) Complexes: Influence of the Ancillary Ligand" Chau-Jiun Chang, Cheng-Han Yang, Kellen Chen, Yun Chi,* Ching-Fong Shu,* Mei-Lin Ho, Yu-Shan Yeh, Pi-Tai Chou,* Gene-Hsiang Lee, ***J. Chem. Soc. Dalton Trans..*** **2007**, *accepted.* **(3.7)**

179 Osmium Complexes with Tridentate 6-(Pyrazol-3-yl) 2,2'-Bipyridine Ligands: Coarse Tuning of Phosphorescence from Red (655 nm) to Near Infrared (935 nm) Region,***Chem. Asian J.*** **2007**, *2 (1),* 155-163.

178 "Phosphorescent Dyes for Organic Light Emitting Diodes" Pi-Tai Chou* and Yun Chi* ***Chem. Eur. J.*** **2007**, *13*, 380-395 **(4.9)**

177 Colour Tuning and Highly Efficient Blue Emitters of Finite Ph_2N-Containing Oligo(arylenevinylene) Derivatives Using Fluoro Substituents. Hao-Chun Li, Yao-Ping Lin, Pi-Tai Chou, Yi-Ming Cheng and Rai-Shung Liu, ***Adv. Funct. Mater.*** **2007,** *17*, 520-530 **(6.7)**

176 "Iridium (I) Pyridyl Azolate Complexes with Saturated Red MLCT Phosphorescence; Fundamental and Possible Applications in OLEDs Chung-Hong Fang, Yao-Lun Chen, Cheng-Han Yang, Yun Chi,* Yu-Shan Yeh, Elisa Y. Li, Yi-Ming Cheng, Chia-Jung Hsu, Pi-Tai Chou,* and Chin-Ti Chen", ***Chem. Eur. J.*** **2007**, *13*, 2686 – 2694.**(4.9)**

175 Pyridyl Azolate Based Luminescent Complexes: Strategic Design, Photophysics and Applications Yun Chi* and Pi-Tai Chou**, **2007**, ***Wiley InterScience,*** *invited review articler.*

174 "Synthesis of 7-Azaserotonin, Its Photophysical Properties Associated with Excited

* State Proton Transfer Reaction" Pei-Wen Wu, Wan-Ting Hsieh, Yi-Ming Cheng, Ching-Yen Wei, Pi-Tai Chou* ***J. Am. Chem. Soc***. **2006,** *128(45)*; 14426-14427.**(7.4)**

173 * "Extensive spectral tuning of the proton transfer emission from 550 to 675 nm via a rational derivatization of 10-hydroxybenzo[h]-quinoline" Kew-Yu Chen, Cheng-Chih Hsieh, Yi-Ming Cheng, Chin-Hung Lai, Pi-Tai Chou*, ***Chem. Commun***. **2006**, 4395 – 4397. **(4.4)**

172 "En Route to the Formation of High Efficiency, Osmium (II) Based Phosphorescent Materials" Fang-Chi Hsu, Yung-Liang Tung, Yun Chi* Cheng-Chih Hsu, Yi-Ming Cheng, Mei-Lin Ho, Pi-Tai Chou,* Shie-Ming Peng, ***Inorg. Chem***. **2006**, *45*(25); 10188-10196. **(3.9)**

171 "Coordination of Fluorine Ligands Toward Sodium Ions Makes the Difference: Aqua Sodium Ions Act as a Brønsted Acid in Polymerization of Vinyl ethers and Styrenes" Chi-Tsing Chang, Chuan-Lin Chen,Yi-Hong Liu, Shie-Ming Peng, Pi-Tai Chou* and Shiuh-Tzung Liu*, ***Inorg. Chem***. **2006,** *45(19)*; 7590-7592. **(3.9)**

170 * "A New Family of Homoleptic Ir(III) Complexes; Tris-Pyridyl Azolate Derivatives with Dual Phosphorescence" Yu-Shan Yeh, Yi-Ming Cheng, Pi-Tai Chou,* Gene-Hsiang Lee, Cheng-Han Yang, Yun Chi,* Chih-Hsiang Wang, ***ChemPhysChem,*** **2006**, *7*, 2294-2297. **(3.6)**

169 "Photoluminescence Electron Transfer Quenching of Rhenium(I)-rectangles with Amines" Rong-Tang Liao, Yen-Hsiang Liu, Ren-Jay Lin, I-Jy Chang, Pi-Tai Chou, R. Ramaraj, S. Rajagopal and Kuang-Lieh Lu, ***J. Phys. Chem. A*** **2006,** *110(37)*; 10683-10689. **(2.9)**

168 "Fluorescent Organic Nanoparticles of Benzofuran–Naphthyridine Linked Molecules: Formation and Fluorescence Enhancement in Aqueous Media" Yeh-Yang Sun, Jen-Hai Liao, Jim-Min Fang, Pi-Tai Chou, Ching-Hsing Shen, Chih-Wei Hsu, Li-Chyong Cheng, ***Org. Lett.,*** **2006,** *8(17)*; 3713-3716. **(4.4)**

167 "The Empirical Correlation between Size and Two-photon Absorption Cross Section on CdSe and CdTe Quantum Dots" Shih-Chieh Pu, Meng-Ru Yang, Cheng-Chih Hsu, Cheng-Chih Hsieh, Pi-Tai Chou,* Sheng-Hsien Lin* and Yi-Ming Cheng, ***Small***, **2006**, *2(11),* 1308-1313.

166 * "A New Class of Laser Dyes, 2-Oxa-bicyclo[3.3.0]octa-4,8-diene-3,6-diones, with Unity Fluorescence Yield" Chao-Yu Wang, Yu-Shan Yeh, Elise Y. Li, Yi-Hong Liu, Shiuh-Ming Peng, Shiuh-Tzung Liu*, Pi-Tai Chou* ***Chem. Commun***. **2006**, 2693-2695. **(4.4)**

165 "Photoluminescence properties of CdTe/CdSe core-shell type-II quantum dots" Yang-Fang Chen*, Chih-Wei Lai, Pi-Tai Chou* ***J. Appl. Phys.*** **2006**, *99*, 123521. **(2.5)**

164 "Osmium and Ruthenium-Based Phosphorescent Materials: Design, Photophysics and Applications" Pi-Tai Chou, Yun Chi*, ***Eur. J. Inorg. Chem.*** **2006**, *17*, 3319-3332. **(2.5)** ***invited review article.***

163 Neutral Ruthenium (II) Based Emitting Materials: A Prototypical Study on Factors Governing Radiationless Transition in Phosphorescent Metal Complexes, Elise Y. Li, Pi-Tai Chou,* Gene-Hsiang Lee I-Hui Lin, Yun Chi,*, ***Inorg. Chem.***, **2006**, *45(20)*, *8041-8051*. **(3.9)**

162 * "Two-Photon Absorption Chromophores with a Tunable [2,2']-bithiophenyl Core" Chia-Feng Chou, Tai-Hsiang Huang, Jiann T. Lin,*, Shin-Chien Pu, Yi-Ming Cheng,

Pi-Tai Chou,* and Chiitang Tsai ***Tetrahedron*** **2006**, *62*, 8467–8473. **(2.6)**

161 * "Fine-tuning Excited-State Electron Transfer from Adiabatic to Non-adiabatic Type in Rigidly Linked 2,3-Dimethoxynaphthalene-Bridge-2,3-Dicyanonaphthalene Systems" Kew-Yu, Chen,[a,b] Cheng-Chih Hsieh,[a] Yi-Ming Cheng,[a] Chin-Hung Lai,[a] Pi-Tai Chou,*[,a] Tahsin J. Chow*[,b] ***J. Phys. Chem. A***,**2006**, *110(44),* 12136-12144. **(2.9)**

160 "Theoretical Investigation of Cheletroptic Decarbonylation Reactions" Chin-Hung Lai,[a] Elise Y. Li,[a] Kew-Yu Chen,[a] Tahsin J. Chow,[b,*] Pi-Tai Chou[a,*] ***J. Chem. Theo. Compt.*****, 2006,** *2(4),* 1078-1084. **(3.0)**

159 "The Photophysical Properties of the Dimeric-Azulene, a Near-infrared Nonfluorogenic Quencher" I-Che Wu,[a] Chin-Hung Lai,[a] Shih-Chieh Pu,[a] Yi-Ming Cheng,[b] and Pi-Tai Chou,*[a] Ching-Yen Wei,*[c] Chao-Ying Yu,[c] Yi-Hsin Lin,[c] and Ching Ting*[c], ***J. Chin. Chem. Soc.,*** **2006***, 53,* 1275-1283. **(0.6)**

158 * "Spectroscopy and Femtosecond Dynamics on 2-(2'-Hydroxy-4'-diethylaminophenyl)benzothiazole; The Role of Solvent Polarity in the Excited-State Proton Transfer Reaction" Yi-Ming Cheng, Shih-Chieh Pu, Chia-Jung Hsu, Chin-Hung Lai and Pi-Tai Chou*, ***ChemPhysChem*** **2006***, 7,* 1372-1381. **(3.6).**

157 "Iridium-Complex Modified CdSe/ZnS Quantum Dots; A Conceptual Design for Bifunctionality Toward Imaging and Photosensitization" Jia-Ming Hsieh,a Mei-Lin Ho, Pei-Wen Wu, Pi-Tai Chou,* Tsai-Tsai Tsung Yun Chi ***Chem. Commun.*** **2006**, 615 – 617. **(4.4)**

156 * "Spectroscopy and Femtosecond Dynamics of Type-II CdTe/CdSe Core-Shell Quantum Dots" Pi-Tai Chou,* Chun-Yen Chen, Chiu-Ting Cheng, Shih-Chieh Pu, Kun-Chan Wu, Yi-Ming Cheng, Yi-Hsuan Chou, and Hsin-Tien Chiu*, ***ChemPhysChem***. **2006**, *7,* 222-228. **(3.6)**

155 * "Synthesis, Structures, and Photoinduced Electron Transfer Reaction in the 9,9'-Spirobifluorene-bridged Bipolar Systems" Sung-Yu Ku, Yi-Ming Cheng, Xiauo-Yun Lin, Ying-Yueh Hung, Shih-Chieh Pu, Ken-Tsung Wong*, Pi-Tai Chou*, Yi-Hung Liu, ***J. Org. Chem.*** **2006**, *71(2)*; 456-465. **(3.7)**

154 "Room-temperature Near-Infrared Phosphorescence of New Iridium (III) Complexes with Ligands Derived from Benzoquinoxaline", by Cheng-Han Yang, Yun Y.C. Chi, Yu-Shan Yeh, Pi-Tai Chou, Hsi-Ying Hsieh, Chao-Shiuan Liu, and Shie-Ming Peng, ***Can. J. Chem.*** **2006**, *84*, 309–318. **(1.1)**

153 "Synthesis and Characterization of New Fluorescent Two-Photon Absorption Chromophores" Ping-Hsin Huang, Jiun-Yi Shen,a Shin-Chien Pu, Yuh-Sheng Wen, Jiann T. Lin,* Pi-Tai Chou* and Ming-Chang P. Yeh. ***J. Mater. Chem***. **2006**, *16,* 850-857. **(3.7)**

152 Unprecedented Orange and Red OLED Performance for the Neutral Charge Ru(II) Complexes; Rational Design and Perspective Toward Color Tuning Yung-Liang Tung, Li-Shiuan Chen, Yun Chi,* Pi-Tai Chou,* Yi-Ming Cheng, Elise Y. Li, Ching-Fong Shu,* ***Adv. Fun. Mater.*** **2006***, 16,* 1615-1626. **(6.7)**

151 "Platinum (II) Complexes with Pyridyl Azolate-Based Chelates; Synthesis, Structural Characterization and Tuning of Photo- and Electrophosphorescence Sheng-Yuan Chang, Jakka Kavitha, Shih-Wen Li, Chan-Shou Hsu, Yun Chi, Yu-Shan Yeh, Pi-Tai Chou, Gene-Hsiang Lee, Arthur J. Carty, Yu-Tai Tao and Chin-Hsiung Chien. ***Inorg.***

Chem. **2006**, *45(1)*; 137-146. **(3.9)**

150 * Potassium Ion Recognition by 15-Crown-5 Functionalized CdSe/ZnS Quantum Dots in H_2O, Chun-Yen Chen,a Chiu-Ting Cheng, Chih-Wei Lai, Pei-Wen Wu, Kun-Chan Wu, Pi-Tai Chou,* Yi-Hsuan Chou and Hsin-Tien Chiu, ***Chem. Commun.*** **2006**, 263-265..**(4.4)**

149 "Design and Synthesis of Ir(III)-Azacrown Complex: Application as a Highly Sensitive Metal Cation Phosphorescence Sensor Mei-Lin Ho,[a] Fu-Ming Hwang,[b] Pei-Nung Chen,[b] Ya-Hui Hu,[a] Yi-Ming Cheng,[a] Kung-Shih Chen,[a] Gene-Hsiang Lee,[a] Yun Chi,[b,*] and Pi-Tai Chou[a,*] "***Org. Biomol. Chem***. **2006**, *4*, 98. **(2.6)**