Electrochemiluminescence studies of tris(2-phenyl-pyridine)iridium(III) complex– preliminary results

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2-phenyl-pyridine (after abstraction of 2’-proton from the phenyl fragment) can act as a bidentate chelating ligand (ppy) forming stable transition metal complexes with unique spectroscopic (high luminescence quantum yields) and electrochemical (pronounced stability of the reduced and oxidized forms) properties. The combination of the electrochemical stability with high luminescence efficiencies of the parent complex molecules suggests their applicability in the current-light converting systems.

Electrochemically generated chemiluminescence (ECL) from the electron transfer reactions involving Ir(ppy)₃ complex was studied in acetonitrile-dioxane (1:1) solutions containing 0.1 M (n-C₆H₅)₄NPF₆ as supporting electrolyte using the triple-potential-step method. ECL spectra and transients indicated that the metal-to-ligand-charge-transfer (MLCT) emission originates from the 3*Ir(ppy)₃ state formed directly by the electron transfer between involved redox precursors. Extremely high ECL emission efficiencies and high population yields of the excited 3*Ir(ppy)₃ MLCT state were found at room temperature implying that the cyclometalated transition metal complexes offer an opportunity to design new, very efficient ECL systems.