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Biomolecular Interaction of Ruthenium(II) Polypyridyl Complexes

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Abstract : A series of ruthenium(II) complexes, including two novel compounds [Ru(dppz)2(L)]2+ where dppz = dipyrido-[3,2-a:2',3'-c]phenazine, and L = 2-phenylimidazo[4,5-f][1,10]phenanthroline (PIP) or 2-(4-hydroxyphenyl)imidazo[4,5-f][1,10]phenanthroline (p-HPIP) have been synthesized and characterized. The previously reported complexes [Ru(bpy)2L]2+ and [Ru(phen)2L]2+ were also prepared. All complexes were characterized by elemental analysis, 1H-NMR spectroscopy, ESI-Mass spectroscopy and FT-IR spectroscopy. The photophysical properties were analyzed by UV-Visible spectroscopy and fluorescence spectroscopy. [Ru(dppz)2(PIP)]2+ and [Ru(dppz)2(p-HPIP)]2+ displayed 'molecular light-switch' effect as they have high emission in acetonitrile but no emission in water. The cytotoxicity of all complexes against cancer cell lines Hela and MCF-7 were investigated through standard MTT assay. [Ru(dppz)2(PIP)]2+ showed moderate toxicity on both MCF-7 and Hela with IC50 of 37.64 µM and 28.02 µM, respectively. Interestingly, [Ru(dppz)2(p-HPIP)]2+ exhibited remarkable cytotoxicity results with IC50 of 13.52 µM on Hela and 11.63 µM on MCF-7 cell lines which are comparable to the infamous anti-cancer drug, cisplatin. The cytotoxicity of this complex series increased as the ligands size extended in order of [Ru(bpy)2(L)]2+ < [Ru(phen)2(L)]2+ < [Ru(dppz)2(L)]2+.

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