

Ruthenium (II) complexes of imidazo-1,10-phenanthrolines: heterogeneous electron transfer and gas sensory properties

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In this work, a series of imidazo[4,5-f][1,10]phenanthroline-containing ligands and their monoruthenium(II) and heterobimetallic complexes were synthesized (Fig. 1 left). These complexes are capable of photo-induced electron transfer to the conduction band of some semiconductor materials (Fig. 1 right). Such photosensitization process will reduce the operating temperature of semiconductor gas sensors and thus reduce their energy consumption.

We have shown that energies of HOMO and LUMO of complexes were suitable for electron transfer from excited state to the conduction band of SnO₂ and In₂O₃. LUMOs of synthesized complexes are of triplet nature with a high lifetime sufficient for electron transfer. Modification of the surface of nanoparticles of SnO₂ and In₂O₃ with Ru(II) complexes gave hybrid organic-inorganic materials that were studied as sensitive elements for gas sensors to NH₃, NO₂ and NO. Hybrid