**Abstract**

A Schiff-base molecule, pyrene motif chemosensor **1** has been synthesized and performed for the fluorescent detection of Cu2+ ions *via* the inhibition of the photoinduced electron transfer (PET) process. Results were observed the exceptional selectivity towards Cu2+ in DMSO-H2O, (1:1 v/v, HEPES = 50 mM, pH = 7.4) and the association constant (Ka) for chemosensor **1** was binding to Cu2+ system have a value of 1.16 × 104 M−1. In addition, the chemosensor **1** has been used as a fluorescence probe for detecting Cu2+ ions in living cells and its binding phenomenon abilities were confirmed by bio-imaging and spectroscopic methods.