We present in this communication the synthesis of new cationic tricoordinated copper complexes bearing bidentate dipyridylamine (dpa) ligands and NHC as ancillary ligands [Cu(NHC)(HDPA)][X]. These copper complexes have been fully characterized by NMR, X-ray analysis, electrochemistry, and photophysics. TD-DFT calculations were also undergone to rationalize the assignment of the photophysical properties. Some of these copper complexes exhibit very bright blue emission with high quantum yield at solid state. A variation of the electronic properties on both NHC and dipyridylamine ligands, has been carried out and permitted to establish a structure – properties relationship, also supported by TD-DFT calculations. A photophysical study at low temperature highlighted a specific luminescence phenomenon of the complexes: Thermally Activated Delayed Fluorescence. Since emissive cationic organometallic complexes can be good candidates for LEC (Light emitting Electrochemical Cells) applications, a selection of copper complexes was achieved for the preparation of those lighting devices. Here is presented the proof of concept that our copper complexes, of general formula [Cu(NHC)(dpa)][X], can be applied for LEC devices. To the best of our knowledge, we are presenting here the first blue emitting LEC device incorporating cationic copper complexes.

Main body with references.\(^1,2\)


$\text{dpa ligand}$

EtOH, reflux, 1h

then KPF$_6$ aq.

$\text{[Cu(NHC)]}$

$\text{[Cu(NHC)(dpa)][PF}_6\text{]}$

56-98%

$\text{1) dpa ligand}$

HBF$_4$ Et$_2$O

toluene, r.t., 3h

2) KPF$_6$ MeOH r.t. 1h

$\text{[CuOH(NHC)]}$