Electrochemiluminescent multinuclear metal complexes for diagnostics

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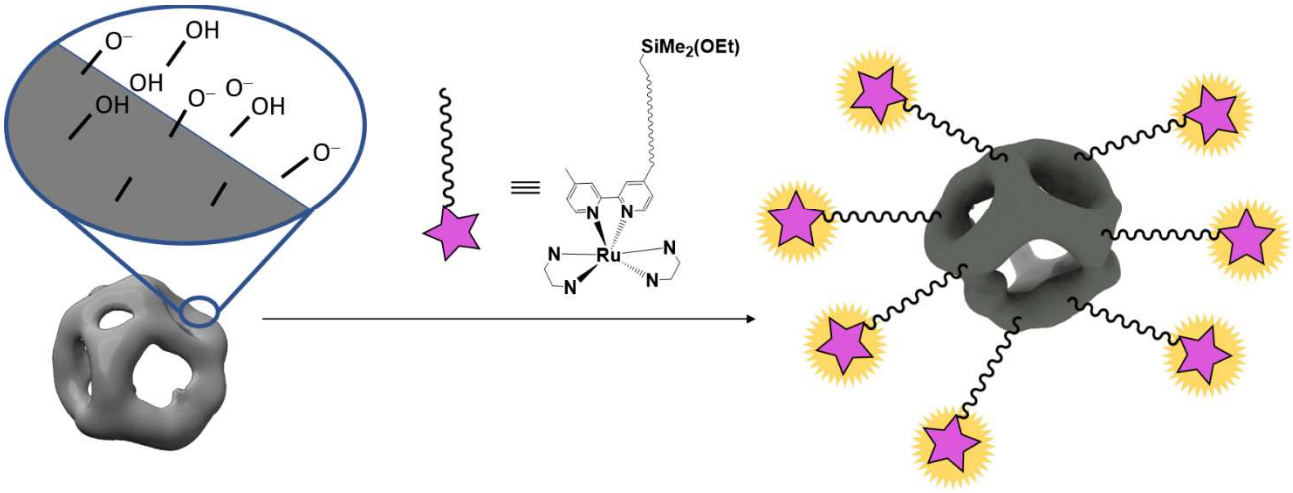
Electrochemiluminescence (ECL) – the production of molecular excited states without light excitation but through charges recombination – is a well-known process. This mechanism presents diverse advantages, vs the most used photoexcitation: i) due to the absence of light excitation the background is reduced; ii) is very sensitive and selective; iii) it finds application in diagnostics and in particular immunoassays reaching detection limit close to femtomolar.[1]

Ruthenium complexes are widely used as emitters for ECL-based detection methods and more recently also other metal complexes have been investigated.[2] In order to improve the detection limit the use of multinuclear compounds has emerged as strategy. However, the ECL signal is not linearly correlated with the number of emitters, due to the self-quenching of the (spatially-closed) compounds.

Here we show a class of water-soluble Ru complexes which have been chemically and spectroscopically characterized. In addition, to increase the signal the grafting of these complexes on different kind of silica nanoparticles was deeply studied. We have compared the single complexes to the formation of multinuclear species by the binding or encapsulation of the emitters on/in the silica nanostructures to assess how their proximity can affect the photophysical properties and ECL amplification.



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References:

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