NEW SYNTHESIS OF GOLD NANOPARTICLES USING N-HETEROCYCLIC CARBENE BORANES

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Gold nanoparticles have been known for a long time and have found applications in many fields such as medicine, optics, electronics or catalysis. Their most common syntheses generally require three components: a gold precursor, a reducing agent and a stabilizing ligand.

N-Heterocyclic carbenes (NHCs) are persistent carbenes with highly tunable structures. In recent years their chemistry has blossomed and they have shown a strong affinity for a wide range of metals1. In the case of gold, this affinity has been shown to be higher than with thiols2.

A few studies have shown the possibility to use NHCs to stabilize gold nanoparticles3–5, starting from NHC-gold complexes, (benz)imidazolium-gold complexes or by exchanging a sacrificial ligand with free NHCs.

NHCs, which are Lewis bases, can also form with borane (Lewis acid) stable adducts6, which exhibit reducing properties. NHC-boranes were thus explored as “2-in-1” reagents, i.e. reducing agent and source of stabilizing ligands, in the synthesis of gold nanoparticles.

A synthesis of NHCs stabilized gold nanoparticles is reported for the first time from NHC-boranes and AuClSMe2 as gold precursor7. XPS analysis confirms the presence of NHCs as surface ligands. Varying the reaction conditions allows tuning the average nanoparticle size in the range 5-10 nm.

![Scheme of the nanoparticles synthesis, TEM image of obtained nanoparticles and corresponding size distribution](image)

References

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