

Cationic and Neutral (Ar-BIAN)Copper(I) Complexes Containing Phosphane and Arsane Ancillary Ligands: Synthesis, Molecular Structure and Catalytic Behaviour in Cycloaddition Reactions of Azides and Alkynes



The Pedro T. Gomes Group



M. Teresa Duarte



TÉCNICO LISBOA



Química Estrutural



FCT



rede de química e tecnologia



The Teresa Avilés Group

Invited for the cover of this issue are the groups of Pedro T. Gomes (Universidade Técnica de Lisboa) and Teresa Avilés (Universidade Nova de Lisboa). The cover image shows the structure of one of the catalysts against a background of a bridge symbolising the collaboration between the two groups.

How did the collaboration on this project start?

We have been interested in complexes containing BIAN ligands since the late 1990s, when their nickel derivatives were thoroughly studied as olefin polymerisation catalysts, after Maurice Brookhart's discovery. After some work with nickel–BIAN complexes, mainly using alternative techniques for the copolymerisation of olefins with polar monomers, we decided to move to other late transition metals. In the meantime, Teresa Avilés was particularly interested in cobalt chemistry, and we started a collaboration in the synthesis of (aryl-BIAN)cobalt(II) complexes and their applications in catalysis, which was extended to metals from group 9 to group 12 of the periodic table.

Did you initially have to motivate the team?

The members of both teams are very easily motivated, not only by the present subject, but also by any other topic in inorganic or organometallic chemistry. We are all chemistry fans! Working as an extended team gave them a good sensation of momentum and pace in their research. This is already the second joint paper in the chemistry of (BIAN)copper(I) complexes and their application in catalysis, and this dynamic interaction has further improved.

Did you expect a very different outcome?

Actually, we would have thought that arsane complexes would be much better catalysts for the cycloaddition reactions of azides and alkynes than the corresponding phosphane complexes, because arsane ligands hypothetically have a lower donating ability and hence greater dissociative lability. In fact, the opposite was observed, which means that the stabilisation of the active catalytic species by the donor ligands plays a very important role in this catalytic reaction.

What was the inspiration for this cover design?

The cover picture shows the X-ray structure of the (aryl-BIAN)-copper(I) complex synthesised in this work that exhibits the best performance in the azide–alkyne cycloaddition reaction (CuAAC). The background represents the 25th of April Bridge, one of the icons of the city of Lisbon, which also symbolises the collaboration between our two research teams, working at different universities of the same city that are located on opposite banks of the river Tejo (Tagus).

Who designed the cover?

My daughter (Inês T. Gomes) created it. She is a graphical designer.

Acknowledgments

We thank the Fundação para a Ciência e a Tecnologia, Portugal, for financial support.

