Controlled synthesis of copper oxide nanoparticles for the study of leaf absorption

Fadoua Sallem, Mickael Wagner, Nicolas Rataj, Eloise Annabi, Ludovic Menjot, Astrid Avellan

Laboratoire Géoscience Environnement Toulouse (GET), Observatoire Midi-Pyrénées (OMP), Centre National de Recherche Scientifique (CNRS)

E-mail : fadoua.sallem@get.omp.eu

Abstract :

Foliar uptake of nanoparticles is a challenging topic that has attracted the attention of researchers in recent years, given that the mechanisms of uptake and translocation in plants are still unknown. In this work, we report the synthesis of copper oxide nanoparticles (CuONPs) and nanohybrids for foliar uptake study. CuONPs are nanofertilizer that could replace the classic inorganic agrochemicals to optimize their effectiveness and better protect crops and their agroecosystems. Indeed, CuONPs are considered as a copper nano-reservoir at leaf level, which will be used over a long period of time which avoid the excessive use of ionic copper form.

In order to understand the translocation mechanism of CuONPs in leaf, it is mandatory to know the keys factors that governs nanoparticles biodistribution. In this work, we have designed copper-based nanoparticles with controlled physical-chemical properties including morphology, size and surface chemistry. A panel of copper-based nanohybrids have been synthesized and fully characterized with many characterization techniques such as X-ray diffraction (XRD), transmission electron microscopy (TEM), dynamic light scattering (DLS), fourier-transform infrared (FTIR) and UV-Visible spectroscopy. The obtained results about the effect of the experimental parameters have allowed us to control the synthesis of CuONPs and propose a hypothesis about their growth mechanism. The interaction of the elaborated nanoparticles and nanohybrids with plant cells will be studied in vitro and in vivo for better understanding of the most influencing factors in foliar uptake and biodistribution.

References :

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