FePO4 nanoparticles as a source of nutrients for plants

Davide Sega, University of Verona

A pilot plant for the continuous $FePO_4$ NPs synthesis was optimized and set up. The system could produce 15 $L \cdot h^{-1}$ of FePO4 NPs suspension. Purification and a stabilization method of FePO4 NPs were optimized, in order to reduce aggregation and sedimentation of particles on long time periods.
FePO4 NPs were then tested for the delivery of P and Fe on two hydroponically grown crops, cucumber and maize. The results showed that $FePO_4$ NPs improved the availability of P and Fe, if compared to the bulk FePO4, as demonstrated by SPAD indexes of leaves and the determination of nutrients concentrations in tissues. However, nutrients availability is strongly influenced by the crop species used. The particles size affected P availability more for cucumber plants, while in maize the material's size affected more Fe availability. TEM observations revealed that FePO4 NPs do not enter into roots, suggesting as mechanism of nutrients delivery the dissolution in the apoplast.