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EXTENDED EDITION

Arsenic removal in drinking water by granular and nanostructured iron composites

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Arsenic (As) concentration in distributed drinking water exceeding the proposed safe limit of 10 µg/L (WHO) are often registered in South East Asia, America and some countries in Europe, Italy included. The problem of arsenic contamination in groundwater is known to have affected worldwide about 100 million people. Until 2010, in Italy more than 1 million of people were still drinking water with As>10 µg/L (EU limit). Up-to-date most successfully implemented removal technologies are coagulation and co-precipitation with addition of Al and Fe salts, sorption on filters, membrane filtration. The choice of an appropriate drinking water treatment often represents a difficult challenge for local authorities. Adsorption processes gained the upper hand among conventional technologies for As removal. Especially filters based on iron composites are the most widely used due to the their possible regeneration, low required maintenance, moderate costs and selectivity toward As. The use of iron nanoparticles (FeNP) is slowly getting into the market of water and soil treatment, but several aspects need to be still fully understood before their use could be economically attractive for large scale implementation. FeNP have an excellent As removal efficiency due to their exceptional high surface area and their selectivity to As species adsorption, but they need suitable supports to be successfully implemented as water filters or as soil additives.

In IRSA-CNR, I currently study As removal in drinking water applying different technologies to develop small-medium scale solutions for family purposes to be implemented in household removal units or as Point Of Use (POU) filters: Zero Valent Iron (ZVI): metallic iron corrosion is used to freshly generate adsorption sites for s removal (column and pilot studies); The influence of nano-akaganeite (β-FeOOH) size and morphology onto As removal efficiency (batch studies); The application of biologically synthetized Fe nanoparticles in removing As (batch and column study on gel and solid material).

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