

## Structural study of bi-metallic Fe-Bi nanocomposites

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Core-shell particles with a magnetic metal core and a non-magnetic functional metal shell are particularly desirable as they display the largest panel of applications, with potential interest for catalysis, biology, or physics. In such a view, combine in a single object metallic iron and bismuth, i.e. a ferromagnet and the most diamagnetic metal, can indeed bring original properties. Moreover, iron and bismuth being totally immiscible in the bulk, we can expect sharp interfaces between the respective domains. The chemical approach to elaborate this highly unusual system largely relies on a one-pot reaction, however involving distinct steps to produce Fe seeds and then release Bi atoms to form the FeBi composite.

Spherical particles with well-defined size have effectively been obtained. Samples picked at different steps of the synthesis have been primarily analyzed using different in-lab techniques in order to probe both their average structure and chemical organization (monochromatic WAXS, TEM, EFTEM) [1,2]. XAS at Fe K edge and Bi LIII edge was also extensively used in order to better understand the numerous and complex processes finally leading to nano-objects including a bismuth-rich core and an iron shell. Unwanted effects from some stabilizers in a highly reactive mixed environment could be detected, and an unexpected and potentially important intermediate amorphous Fe-Bi alloy could be clearly evidenced.

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2. J.G. Mattei, F. Pelletier, D. Ciuculescu, P. Lecante, J.C. Dupin, N. Yaacoub, J. Allouche, J.M. Greneche, D. Gonbeau, C. Amiens, M.J. Casanove, J. Phys. Chem. C 117 (2013) , 1477-1484.