

Functionalization of Metal Oxide NWs for Chemical Sensors and Electronic Noses

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Material science is at the base of nanotechnology, holding the promise to increase industries efficiency bringing profoundly new applications. Concerning functional materials, easy and cheap growth techniques for the production of nanostructures in a variety of morphologies are constantly proposed by the research community.

Metal oxides represent an assorted and appealing class of materials which properties cover the entire range from metals to semiconductors and insulators and almost all aspects of material science and physics in areas including superconductivity and magnetism. In particular metal oxides in forms of nanowires are interesting materials for their peculiar morphology that assures a high surface to volume ratio necessary to maximize surface related properties like the ones governing chemical sensing transduction principles.

When developing 1D nanocrystals the most important requirements are dimensions and morphology control, uniformity and crystalline properties. The thermal evaporation and oxidation methods have been used to prepare a variety of oxides such as tin, zinc, copper, nickel, tungsten and will be extensively described since they are among the most explored in the recent papers and the cheapest for single crystal production. Moreover the oxides have been functionalised using reduced graphene oxide and other metal oxides to form heterojunctions. The idea is to use oxide themselves as functionalisations. Several synergetic effects can derive from these nano-composite systems. The presence of one phase can stabilize the second one, act as a filter or catalyst for selected gas phase reactions. Finally we will present some applications in the field of food safety with sensor arrays made by metal oxide of NWs in the Electronic Nose configuration.