Université catholique de Louvain **UCL** SECTEUR DES SCIENCES ET TECHNOLOGIES

Institut de la Matière Condensée et des Nanosciences

Invitation à la soutenance publique de thèse

Pour l'obtention du grade de Docteur en Sciences de l'Ingénieur de l'UCL et de Docteur/PhD en Chimie de l'Université de Yaoundé 1

Monsieur Roussin LONTIO FOMEKONG

Master en Chimie des Matériaux

Nickel-zinc mixed metal oxide: Coprecipitation synthesis and application as gas sensors

Semiconducting metal oxide based sensors have been widely used for the detection of toxic, hazardous and combustible gases for the safety of human beings and environmental control. Even though this type of gas sensor has several advantages, one of its main drawbacks is the poor selectivity. To enhance the selectivity, the use of doped metal oxide and the composite materials are investigated. The synthesis method of those materials has a great influence on their sensor performance. This thesis reports the synthesis, characterization and gas sensor investigation of nickel-zinc mixed metal oxides prepared by thermal decomposition of the corresponding precursors (nickel-zinc malonate), presynthesized by coprecipitation.

The precursors, nickel zinc malonate blends, with various Ni/Zn ratio, were synthesized by coprecipitation in an aqueous solution and characterized. The results showed that the precursor is a homogeneous mixture of nickel malonate and zinc malonate. Alternatively the nickel malonate precursor was successfully modified by a surfactant (oleylamine). The as synthesized precursors were decomposed and characterized. The results indicate the formation of one phase ($Ni_{1-x}Zn_xO$), identified as the cubic NiO structure when the Zn percentage is lower than 20 %, and two phases ($Ni_{1-x}OZn_xO/ZnO$) when the Zn percentage is equal or greater than 20 %. It was also found that the oleylamine reduces considerably the particle size of NiO.

The sensing performance of all the nickel-zinc mixed metal oxides synthesized was investigated for CO, H_2 and NO_2 gases. For Zn-doped NiO, the optimal response and the selectivity to CO is obtained with 2 % of Zn doping. For the composite material, it is found that the $Ni_{1-x}Zn_xO/ZnO$ (1:1) shows the best sensor performance and this was explained by the formation of a p-n heterojunction.

Jeudi 14 avril 2016 à 15h00

Auditoire DOYE 21
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