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Contribution ID: **256**   Type: **Poster Presentation**

Synthesis and characterization of reproducible stoichiometry of cobalt sulfide nanoparticles using sulphur containing single-source precursors

Wednesday, 13 July 2011 17:00 (2 hours)

<p>Cobalt sulphide nanoparticles are one of the most complex and challenging particles to synthesize due to strongly reducibility of the cobalt ion and the oxidizable nature of the sulphide ion. Cobalt sulphide therefore exist in various phases with different compositions including Co_4S_3, Co_9S_8, CoS, $Co_{1-x}S$, Co_3S_4, Co_2S_3 and CoS_2. Herein, we describe the synthesis of Co_xS_y nanoparticles; furthermore we interrogate the influence of the reaction conditions on the structure and optical properties of the nanoparticles. Co_xS_y nanoparticles were synthesized by thermolysis of N, N, N´, N´-tetramethylthiuram disulphide cobalt (II) complex in the presence of stabilizing agent Hexadecylamine (HDA). The advantage of this method is that the bond between the cobalt and sulphur atoms already exist, therefore decomposition of the complex at write conditions will result in the formation of Co_xS_y nanoparticles. The cobalt sulfide nanoparticles were prepared by varying concentration from the range 5.0 mg to 5.0 g of the $CoCl_2[(CH_3)_2NCS_2S_2CN(CH_3)_2]_2$ complex at 130 ℃ temperature. The effect of temperature was also investigated by varying the temperature from 80 to 250 ℃. The nanoparticles were characterised by a combination of absorption spectroscopy, photoluminescence (PL), X-ray diffractometry (XRD) and transmission electron microscopy (TEM).

Level (Hons, MSc,
   PhD, other)?

M-Tech

Consider for a student
   award (Yes / No)?

Yes

Would you like to <br> submit a short paper <br> for the Conference
 Proceedings (Yes / No)?

Yes

Primary author: Mr SIBOKOZA, Simon Bonginkosi (Student at Vaal University of Technology)

Co-authors: Prof. MOLOTO, Makwena Justice (Supervisor);   Dr MOLOTO, Nosipho (Co-supervisor)

Presenter: Mr SIBOKOZA, Simon Bonginkosi (Student at Vaal University of Technology)

Session Classification: Poster1

Track Classification: Track A - Condensed Matter Physics and Material Science