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Elaboration and characterization of nanosized RuO2-TiO2 powder by Sol Gel route

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Abstract : Mixed metal oxide, RuO_2-TiO_2 powders were successfully synthesized via a sol gel method and reflux process by using hydrolysis of titanium oxide nanopowders (prepared in the first stage by sol gel route) with its mixture anatase and rutile phases and $RuCl_3$ as rhutenium source in water and alcohol. Nanopowders thus prepared are characterized by X-ray diffraction, UV solid, SEM, ATG and FT-IR techniques. The XRD spectrum confirms the complete conversion of $RuCl_3$ to RuO_2 with the presence of TiO_2 in its anatase phase only, which is due to the conversion of rutile TiO_2 to anatase TiO_2. The crystallite size calculated from Debye-Scherrer's formula is 9 nm. UV solid study show that the characteristic absorption bands of TiO has a low intensity; this is only due to the strong absorption of RuO_2 by contribution to titanium oxide. It is reported an increase in absorption intensity with the RuO_2 content. This can be attributed to the external effect of resonance related to the excitation of electron collective oscillations in the RuO_2 nanoparticles by the electric field of the electromagnetic wave.

Keywords : nanopowders, sol gel, RuO2-TiO2