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***In situ* synthesis of cobalt and cobalt carbide nanostructures using decomposition of cobalt acetate**

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Abstract

A green chemical route is reported for the synthesis of cobalt and cobalt carbide nanostructures using decomposition of cobalt acetate salt in a carbon matrix *in situ* during spark plasma sintering (SPS). The effect of SPS pressure on the phase formation was studied in detail and it revealed that with increase in pressure from 30 to 60 MPa the interaction between Co and C atoms increases resulting in the formation of only pure face centered cubic Co at 30 MPa to predominantly Co₂C phase at 60 MPa. The magnetization measurements revealed a decrease in magnetization (*M*) value accompanied by an increase in coercivity (*H_c*) value with increase in pressure. For a sample with predominant Co₂C phase a *M* value of 35 emu/g and *H_c* value of 786 Oe was obtained.

Key words: Cobalt carbide nanoparticles, Spark plasma sintering, Magnetism, XRD.

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