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Chemistry Department – Faculty of Science



**Preparation and Characterization of Some Transition
Metal Compounds for Analytical and Industrial
Applications**

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Abstract

Carbides, a very unique field of research, becoming very attractive and promising candidates in modern scientific and technological application. Among these, chromium and vanadium carbides exhibit extremely good strength, hardness, corrosion resistance, surface characteristic, etc.

These properties are further enhanced by synthesizing chromium carbide and vanadium carbide in nano scale.

Nano grained materials exhibit superior properties than conventional one. The present work is an attempt to synthesize carbides nanoparticles by thermo-chemical reaction route where metal oxides are reduced to nano-carbides at temperature 800 °C for 20 h. The product powder was investigated using field emission scanning electron microscope/ energy dispersive X-ray and X-ray diffraction, transmission electron microscope.

Vanadium and chromium carbides are successfully synthesized and investigated as electrode materials for electrochemical capacitors.

Chromium carbide coatings were grown on AISI O2, via pack cementation method. Vanadium carbide coatings were grown on AISI D3 cold work tool steel via salt bath method.

Keywords: Transition Metal carbides TMC, Nanopowders, Coatings, Corrosion, Hardness, TEM, SEM.

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Aim of the work

- preparation transition metal carbides as vanadium and chromium carbides in nano scale particles in single step.
- Characterization of nano-carbides by different techniques as TEM, SEM/EDS and XRD.
- Transition metal carbides used in electrochemistry application.
- Transition metal carbides used in surface engineering application.
- Characterization and kinetics of Chromium Carbide coatings on cold work tool steel performed by Pack-Cementation.
- Characterization of vanadium carbides Coatings on Cold Work Tool Steel Produced by TRD.

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