

MCP법에 의한 TiC합성에 대한 연구

The study on synthesis of TiC powder by MCP

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Titanium Carbide(TiC) have been used to cutting tools and die materials because it has high hardness(31.4GPa) and high melting point(3065~3257°C), low electricity resistance(60~250 $\mu\Omega$ cm) and strength against abrasion and corrosion. Because the mechanical properties of final TiC products depends on the quality and characteristics of starting powders, high quality TiC powders have to be developed intensively.

TiC powders have been produced by various methods such as carbothermal process, self heated reactive sintering, sol-gel process and gas reactive methods, but these have weak points of requiring high reaction temperature of 180~2200°C, long post-milling process, long production time and raw material with high purity. Therefore, in this study, in order to overcome the above weeks points, mechanical-chemical methodology from TiCl₄ solution and CaC₂ powder was applied to produce nano grade TiC powders.

The high energy mechanical milling process was carried out with planetary mill at ball-to-mixture(TiCl₄ solution and CaC₂ powder) weight ratio of 50:1. The ratio of TiCl₄ was varied from 1 to 3 to investigate the influence of quantity of TiCl₄ solution. Milling process was carried out in a steel jar with W balls during 3 hours milling in 300rpm. The remained TiCl₄ and formed CaCl₂ were removed by distilled water. The MCP powders were characterized by X-ray diffractometry(RIGAKU) and a scanning electron microscope(SEM, JEOL).