Iranians Improve Nanocomposite Synthesis

Iranian researchers at the Islamic Azad University have synthesized an alumina-titanium diboridenanocomposite at an ambient temperature in a short period of time to modify the mechanical properties of titanium diboride.

Titanium diboride is a ceramic with desirable properties such as high level of hardness, appropriate electrical conductivity at 25°C, high chemical resistance against non-ironic molten metals and relatively low specific gravity, Iran Nanotechnology Initiative Council reported.

However, titanium diboride has poor mechanical properties. Adding alumina to titanium diboride forms a composite that improves its mechanical properties.

"Titanium diboride and its composites can be synthesized through various methods such as combustive synthesis, direct oxidation of metal, mechanical alloying and pressure-free inoculation of metal," Mohammad Ali KhaqaniDahaqani, one of the researchers of the study, said.

"Taking into consideration the valuable advantages of alumina-titanium diboridenanocomposite, we sought to synthesize the nanocomposite by using cheap materials and simple and available equipment in a shorter period of time."

Explaining the procedure of synthesizing nanocomposite, he said, "We synthesized the nanocomposite through a mechano-chemical method. To this end, we milled titanium dioxide, boric acid and pure aluminum powders at an ambient temperature in the presence of argon at various intervals by using a ball-mill device. Then, the products were analyzed to study their microstructure and phase analysis."

"The results of the tests showed that it is possible to synthesize alumina-titanium diboridenanocomposite at room temperature," Dahaqani concluded.