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## **Microstructural Study of Titanium Nitride Produced by High Pressure Combustion Synthesis**

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Titanium nitride ceramics are suitable for use as a coating for cutting tools due to their high hardness and chemical stability. In this study, high pressure combustion synthesis was used to produce dense stoichiometric cubic titanium nitride. The effects of two major parameters, the compaction pressure of the titanium powder and nitrogen gas pressure, were investigated. Experiments were conducted at high nitrogen pressures varying from 6 to 200 MPa. An increase in the atomic percentage of nitrogen with the nitrogen gas pressure was observed. No influence in the compaction pressure was seen, which was related to the melting of titanium during the combustion synthesis. The microstructure of the materials was observed to be made up of a dense bulk structure surrounded by a porous stoichiometric TiN surface layer. For nitrogen gas pressures higher than 20 MPa, the bulk structure was made of the cubic  $\alpha$ -TiN phase only. An additional minor phase of Ti<sub>2</sub>N was detected for the lowest pressure of 6 MPa.