

Formation of Titanium and Zirconium Nitrides in an Nitrogen Plasma Arc

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The formation of titanium and zirconium nitrides by the nitridation of respective metals in a nitrogen plasma arc and the measurement of properties of products were studied. The products obtained by the nitration of molten metal were mixtures of nitride and metal. The homogeneous nitride was obtained by the annealing of the mixture in the nitrogen-argon or the argon plasma arc, the power of which was about 1.5 kW to prevent the vaporization of nitride. There are ranges of homogeneity of cubic TiN and ZrN extending 35 - 50 at.% N and 40 - 50 at.% N, respectively. The measured values of the density of homogeneous TiN and ZrN were in agreement with those determined by means of X-ray diffraction. The products were found to be superconducting and the transition temperature, T_c , varied with composition. The highest T_c was reached for the stoichiometric TiN and ZrN and was 5.2 K and 10.1 K, respectively.

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