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PREPARATION OF Al_2O_3-SIC-ZrO_2 COMPOSITE POWDER, S.M.B.Veiga; J.C.Bressiani*; IPEN, Inst. Pesq. Energeticas e Nucleares, P.O. Box 11049, 05422970, São Paulo, Brasil; M.M.Veiga, DMMPE; A.C.D.Chaklader, DMME, University of British Columbia, Vancouver, B.C., V6T 1Z4, Canada.

Alumina ceramic has shown improvement in the strength and fracture toughness with zirconia and silicon carbide. The advance composite powder Al_2O_3-SiC-ZrO_2 can not be synthesized directly by carbothermal reactions from cheap precursor materials such as kaolinite or kyanite and zircon. Al_2O_3-SiC-ZrC is preferentially formed at 1500 °C, induction furnace and argon atmosphere. Variations in the amounts of kaolinite or kyanite and zircon did not form different products but rather the same composite with different compositions. The partial CO pressure controls the ZrC temperature formation. Thermodynamic data have supported the test results. A mixture of alumina and fine dispersed particles of ZrC and SiC is obtained from carbothermal reactions. Zirconia is obtained from ZrC in a subsequent oxidation process of the composite powder. An oxidizing reagent is needed to transform all ZrC into ZrO_2 to obtain Al_2O_3-SiC-ZrO_2 as final product.