## Cyclic Oxidation behavior of Detonation Gun sprayed Al<sub>2</sub>O<sub>3</sub>-13%TiO<sub>2</sub> on Nickel based Super Alloy at Different Temperatures

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**Abstract**—Oxidation is the major source of degradation of metals and alloys subjected to elevated temperatures such as gas turbines, boilers, internal combustion engines and industrial waste incinators. Therefore, in such applications, superalloys are used which have excellent mechanical strength, creep deformation resistant, good thermal stability along with protective coating of Thermal Barrier Coating(TBC). TBC serves to insulate the components from large and prolonged heat loads. In the current study,  $Al_2O_3$ -13%TiO<sub>2</sub> along with bond coat of Ni-20Cr was deposited on nickel based superalloy superni76 by Detonation-gun technique. The characterization of the as-sprayed coating as well as the exposed coating and alloy was done by scanning electron microscope, X-ray diffraction (XRD) and EDS. Cyclic oxidation experiments were conducted for 50 cycles each for 700°C, 800°C and 900°C. Each cycle consisted of 1hr heating in furnace followed by 20 min cooling in still air. The weight change measurements were taken after each cycle to establish the kinetics of oxidation at each temperature. The D-gun sprayed coating has shown good oxidation resistance owing to lower values of parabolic constant  $k_p$  as well as good adherence to the substrate under the given environment upto 800°C but the top coat of TBC fails at 900°C.