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AERO-COAT: Design, Synthesis and Characterization of multilayered coatings based on rare earth zirconates for Aerospace Applications

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Modern aeronautics technologies require special structures and properties enabling their safe operation in harsh conditions such as extreme high/low temperatures, high thermal shock, high pressures and mechanical stresses, radiation or corrosion. The number of materials that can be used in extreme environments is limited because they are restricted by some critical requirements: high melting point, chemical inertness, low thermal conductivity, no phase transformation between room temperature and operation temperature [1]. The ambition of AERO-COAT project is to create an unique point of entry at National level offering high-level research and technological services to improve the actual TBCs for aerospace application, design and develop completely new coating solutions fully characterized and certified required in extreme conditions application and also offering rapid solutions for repairing damaged parts by coating with novel selected materials [2, 3].Zirconia doped with mixed rare earth oxide (REO-ZrO2), lantanum zirconate (LZO) and gadolinium zirconate (GZO) have been prepared by a soft chemical process using hydrothermal technology, the optimal synhtesis conditions being achieved by thermodinamic prediction [4]. Different coatings arhitectures based on the system NiCrAlY/REO-ZrO2/LZO/GZO have been produced by a combinatorial Electron-Beam Physical Vapour Deposition (EB-PVD) on Ni-based high temperature alloys, based on multiscale modelling of thermal conductivity. The ahesion of coatings were studied by scratch test and friction studies. The thermal shock properties were studied in detailed using a special equipment allowing heating and cooling in air or liquid nitrogen [5]. The evolution of microstructure after thermal shock tests allow to select coatings arhitecture for future demonstration at pilot scale.

Biography

Radu-Robert Piticescu has completed his licence and PhD from University POLITEHNICA Bucharest and performed more training stages in Nanomaterials and Advanced Materials at CNRS-IMP Odeillo France. He was Head of Nanostructured Materials and actually is Senior Scientist and Innovation Manager in IMNR. He has published more than 75 papers in reputed journals and has been serving as an editorial board member of Manufacturing Review and Guest Editor for more repute journals.