Potential of hybrid water-stabilized plasma torch for high-throughput deposition of tailored coatings via suspension/solution plasma spraying

Radek Musalek, Ph.D.
Institute of Plasma Physics of the Czech Academy of Sciences
Prague, Czech Republic

Recently developed hybrid water-argon plasma torch technology combines benefits of both conventional gas-stabilization and water-stabilization principles. Thanks to the high enthalpy of the generated plasma, this torch may be used for cost-effective spraying with liquid feedstocks at high feed rates (higher than 100 ml/min). Different strategies leading to deposition of coatings with distinguishable tailored microstructures (e.g. strain-tolerant columnar cauliflower-like, extremely porous or dense coatings) will be presented and illustrated on several ceramic coatings (including YSZ, Gadolinium Zirconate, YAG) relevant namely for high temperature applications. Build-up mechanisms and impact of the microstructure on the coatings properties will be discussed.