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Title: “Strategies to increase the functional temperature of aeroparts in respect with the environmental challenges”

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Abstract:

To meet environmental challenges, it is necessary to reduce fuel usage, NO_x and CO/CO₂ emissions of aero-engines or to change propellants composition. A way to achieve all these elements is generally to increase the functional temperature for better engine efficiency. Consequently, new thermal barrier coatings systems must be developed to ensure the maximum lifetime. Two strategies can be followed regarding the interface pre-treatment as well as the coating composition. Coating adhesion by thermal spraying method requires sufficient surface roughness on the scale of the particles impacting the surface, particularly in the case of plasma spraying with particle melting state. The grit blasting process is mainly used to create the fine asperities required for the spread particles to adhere. To further increase adhesion, the use of laser texturing for metallic substrates is benefit. A second way may consist in adjusting thermal expansion coefficient by spraying ceramic/metal Functionally Graded Materials (FGM). Different types of FGM can be elaborated to assess the influence of the compositional profiles showing an excellent resistance with limited degradation signs. Some results illustrating these two different approaches will be given.