PROJECT SUMMARY

‘A Study on New Highly Reflective Thermal Barrier Coatings’

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ABSTRACT
(limit 200 words)

The engines of an aerospace vehicle are typically subjected to significant temperature extremes and degradation in oxidizing and corrosive environments. Thermal barrier coatings (TBCs) are used to improve the engine efficiency and durability. TBC is usually prepared from ceramic powders in a plasma spray process. We propose to develop new highly reflective thermal barrier coatings using core/shell powders to reduce thermal radiation transport through TBC systems. To form a core/shell configuration, the core ceramic “A” powders with a typical diameter of 20-50 \( \mu \)m will be used; Ceramic “B” will then be applied mechanically (ball milling) or chemically (Sol-gel) onto the core to form a thin shell. YSZ (high refractive index) and Al\(_2\)O\(_3\) (low refractive index) will be used in this study to form the core/shell composite powders. After forming the core/shell composite powders, the plasma spraying system will be used to deposit the composite splats. The typical thickness of the splats, around 1 \( \mu \)m, is well suited to form the multi-layered structure with alternating refractive indices. By adjusting the core/shell sizes and plasma spray parameters, a new technique of building multiple layers with different refractive indices could be developed using novel core/shell composite powders.