

Heat Resistant Ceramic Coatings Offer Thermal Protection for Hypersonic Flight

AFOSR-supported research at the University of Arizona is investigating high-temperature resistant ceramic coatings that will provide thermal protection for Air Force hypersonic flight vehicles.

The research team, led by Dr. Erica Corral, is using advanced chemical synthesis and ceramic processing methods to process the ceramic compositions onto carbon composites, which are the materials used to fabricate lightweight and high-strength aerospace vehicles. The major steps in advancing this technology are based on relevant testing of the ceramic coatings under extreme temperature, heat flux and gaseous species environments.

Even now there are challenges in performing some of the relevant tests that require simulating extreme aerothermal environments where temperatures on the surface of the aircraft can go as high as 2800 degrees C or one-half the surface temperature of the sun. The researchers have been harnessing the power of the sun and focusing the solar radiation at a specific heat flux to investigate high-temperature oxidation resistance that their coatings provide,

Scientists anticipate future hypersonic vehicles with ultra-high temperature ceramic coatings will be capable of sustained flight at Mach 7 or more, making it possible to travel from Los Angeles to New York in 30 minutes.

In the process of leading this research effort, Dr. Corral was named the most promising doctoral engineer or scientist this year by the Hispanic Engineer National Achievement Awards Conference, or HENAAC. She also received an Air Force Office of Scientific Research Young Investigator Program Award in 2010.



*There exist critical challenges in performing some of the relevant tests that require simulating extreme aerothermal environments where temperatures on the surface of hypersonic aircraft can go as high as 2800 degrees C or one-half the surface temperature of the sun.
(University of Arizona Image)*