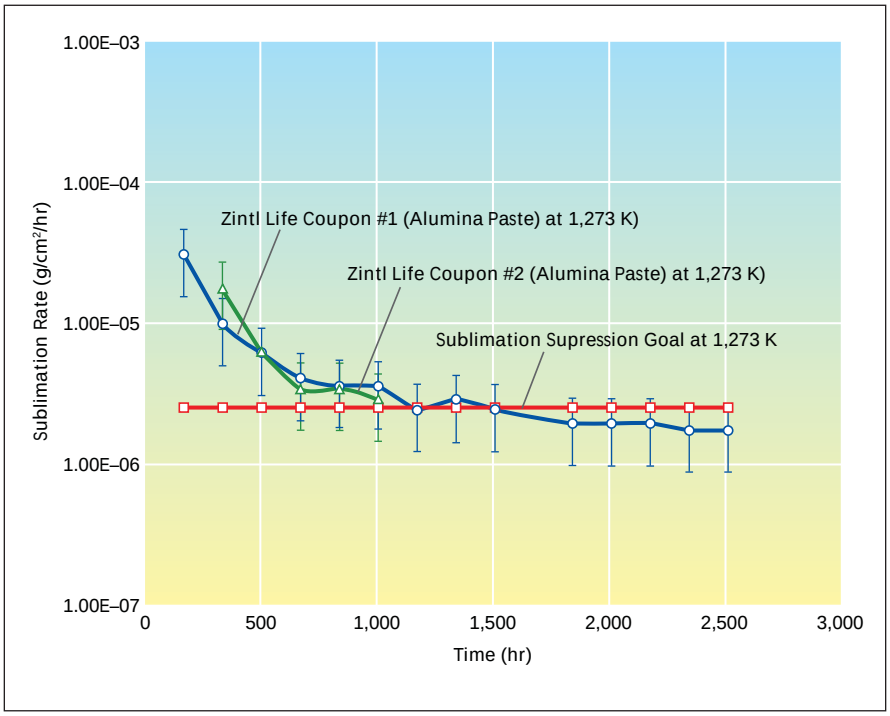

Sublimation Rate Measurement with $Yb_{14}MnSb_{11}$ coupons with an alumina paste layer. The sublimation rate at the beginning of life is rather high, but the rate decreases steadily and after 1,500 hours, the rate reaches below the goal and the filling of the pore during sublimation is believed to be the reason for the rate decrease with time.

mation of $Yb_{14}MnSb_{11}$ fills the porous structure of the alumina paste, causing sublimation to decrease with time as the pores become filled. During testing, it was found that application of this paste caused an initial ten-fold decrease in sublimation, but this factor increased with time. At 1,500 hours of burnout time at 1,273 K, the decrease in sublimation was measured as much as 1,000 times lower.

A commercial alumina paste was applied to $Yb_{14}MnSb_{11}$. Both elements were polished to remove oxidation, then the paste was applied to the $Yb_{14}MnSb_{11}$. The $Yb_{14}MnSb_{11}$ exhibited 2×10^{-6} to 3×10^{-6} g/cm^2 sublimation rate at 1,000 °C after initial burnout. With this rate, the sublimation barrier becomes suitable for 14-year operation, with less than 10 percent cross-section reduction at the hot side junction.

Using scanning electron microscope imaging, the alumina layer was found to be converted into a denser composite of alumina and ytterbia. This clogged, dense layer makes an effective sublimation barrier.

This work was done by Jong-Ah Paik and Thierry Caillat of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

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High-Temperature Solid Lubricant Coating

John H. Glenn Research Center, Cleveland, Ohio

NASA PS400 is a solid lubricant coating invented for high-temperature tribological applications. This plasma-sprayed coating is a variant of the previously patented PS304 coating, and has been formulated to provide higher density, smoother surface finish, and better dimensional stability.

This innovation is a new composite material that provides a means to reduce friction and wear in mechanical components. PS400 is a blend of a nickel-molybdenum binder, chrome oxide hardener, silver lubricant, and barium fluoride/calcium fluoride eutectic lubricant that can either be sprayed or deposited by other means, such as powder metallurgy. The resulting composite material is then finished by grinding and polishing to produce a smooth, self-lubricating surface.

This work was done by Christopher DellaCorte and Brian J. Edmonds of Glenn Research Center. Further information is contained in a TSP (see page 1).Inquiries concerning rights for the commercial use of this invention should be addressed to NASA Glenn Research Center, Innovative Partnerships Office, Attn: Steven Fedor, Mail Stop 4–8, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to LEW-18561-1.