



## 講演会のお知らせ

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### **Foil Gas Bearings and Solid Lubricants for Hydrogen Turbomachinery Systems: Technology and Tribology Applications**

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#### **Abstract**

Technological and tribological challenges face the adoption of hydrogen as a fundamental chemical fuel source in conventional internal combustion engines and in solid-state (fuel cells) power conversion systems. Though hydrogen is a well-understood industrial material, its volatility and permeability has limited its use beyond the space and chemical industries. To deploy hydrogen as a widespread fuel source, hydrogen utilizing machines and systems that are reliable and efficient must be developed. In many cases, sliding contacts and other mechanisms operating in hydrogen cannot be avoided.

In this lecture a novel approach is presented in which hydrogen is used as a fluid lubricant in compliant surface foil gas bearings. These bearings enable hydrogen turbo pumps and compressors to operate efficiently. They also permit the commercialization of hybrid turbine-fuel cell systems in which the Oil-Free turbine provides the clean air supply for the fuel cell. Gas bearing technology is introduced along with some of the lesser-known solid lubricants that can be used to provide low friction and wear during start-up and shut down conditions when sliding is inevitable. Future needs and remaining technical challenges for research are also explored and presented.

Keywords: solid lubricants, coatings, friction, wear, high temperature, turbines, foil gas bearings, fuel cell blowers, hybrid turbine-fuel cells.

[http://www.grc.nasa.gov/WWW/StructuresMaterials/TribMech/research/D\\_OilFree.html](http://www.grc.nasa.gov/WWW/StructuresMaterials/TribMech/research/D_OilFree.html)

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