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## Licensing Opportunities

- Exclusive
- Non-exclusive
- Research  
Sponsorship

Lehigh Case #103006-01

## *Electrode material for high-reliability and high performance micromechanical switches*

### Overview

A new gold-vanadium oxide alloy that exhibits high hardness and low electrical resistivity compared to other gold alloys used in micromechanical switches has been developed for radio frequency devices used in communication and sensing (e.g., radar) equipment. One design for such a switch depends on the reliable closure of electrical contacts for billions of cycles. Gold is the most common material for these contacts, but suffers from reliability problems due to inherent softness.

Several gold alloys such as gold-platinum have been proposed as replacements, but some electrical performance is lost in exchange for increasing lifetime. Initial experiments with the new Au-vanadium oxide nanoparticle-strengthened alloys indicate the potential for greatly increased lifetime with less sacrifice of electrical performance. Furthermore, the material cost should be less than for a pure gold or gold-platinum alloy electrode. Vanadium is an acceptable material in many semiconductor fabrication facilities and may therefore enable easy adoption.

### Applications and Advantages

- Gold-vanadium oxide exhibits high hardness and low electrical resistivity compared to other gold alloys – thus, ideal for micromechanical switches.
- Gold-vanadium oxide can be easily adopted into existing semiconductor fabrication facilities.
- Good thermal stability
- Less expensive material when compared to pure gold or gold-platinum

### Status and Intellectual Property

A U.S. utility patent application has been filed.

### Lehigh ExpertNet

- [Richard Vinci](http://expert1.cc.lehigh.edu/LehighExperts/ExpertDetail.aspx?ExpertID=70125322) -  
<http://expert1.cc.lehigh.edu/LehighExperts/ExpertDetail.aspx?ExpertID=70125322>