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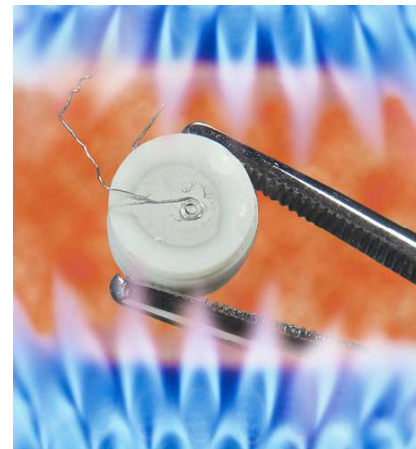
A U.S. Department of Energy laboratory
managed by UChicago Argonne, LLC

High-Temperature Zirconia Oxygen Sensor with Sealed Metal/Metal Oxide Internal Reference

**Jules Routbort and Dileep Singh,
Energy Systems Division, Argonne National
Laboratory**

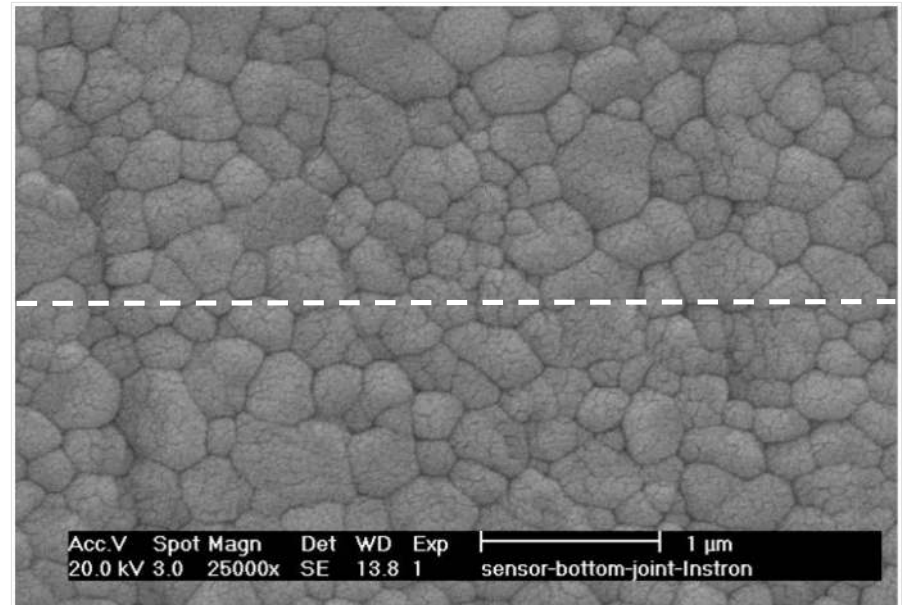
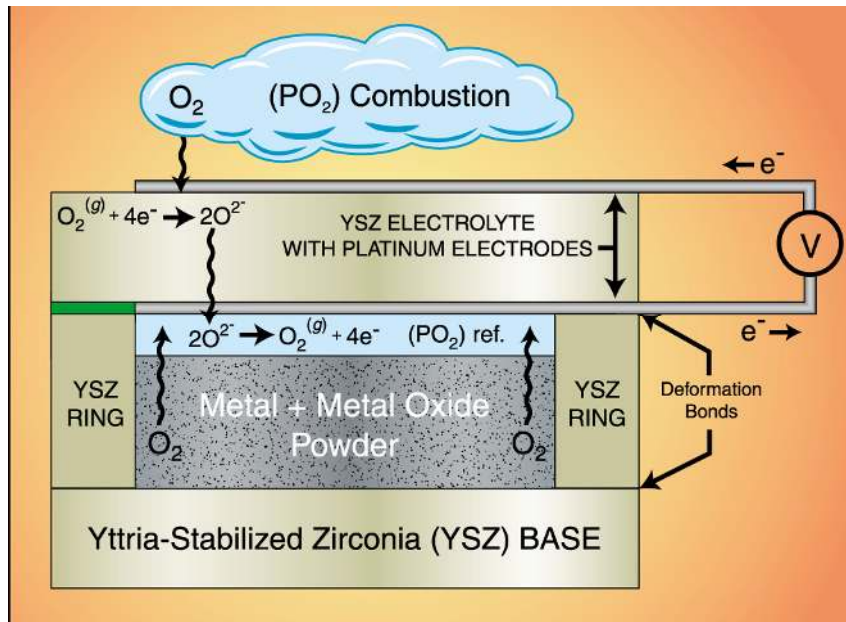
**Argonne, IL 60439
John Spirig and Prabir Dutta,
Chemistry Department, Ohio State University
Columbus, OH 4320**

P5 – Next to Bar



Application based on ANL Patent “Joining by Plastic Deformation”

- Ceramics, intermetallics, composites joined by grain-boundary sliding, $T \leq 0.5T_m$, no surface preparation, low stress, $\epsilon \leq 0.05$
- Boundary shows no porosity
- Fracture occurs away from the joint



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