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Battelle Number(s):

13501-E

Patent(s) Issued

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Available Technologies

Gas-Tight Sealing Method

SUMMARY

The long-term performance of a solid oxide fuel cell is very dependent on the materials and techniques used to hermetically seal the components of the stack. Researchers at PNNL have developed a method for fabricating durable and thermal-mechanically stable seals for solid oxide fuel cells (SOFC) needing metal-to-metal or metal-to-ceramic joining.

Known as the Gas-Tight Sealing Method, the technique employs a surface modification or coating that creates an optimum surface for the seal. Aluminum is applied to the metal component surface and oxidized to form Al_2O_3 or an oxide film embedded with nodules is thermally grown on the surface of metal substrate. The surface modification changes the surface chemistry and morphology of the metal allowing for better compatibility with other metal parts and sealing materials. The nodules embedded in the metal bonding surface that provides for better adhesion to a sealing layer of glass, metal or a combination of materials.

ADVANTAGES

- * More durable, better performance—chemical reactions between surfaces are mitigated improving long term thermal stability of the seal during thermal cycling
- * Reliability built in—the mechanical interlocking that occurs with the nodules and the sealing material results in a stronger, stable seal
- * Energy efficiency – the resulting hermetic seal blocks energy from undesirable “escape” from the fuel cell stack.

Patents & Intellectual Property

- » Patent #: 6,843,406

Technology Portfolio(s)

- » SOFC

Potential Industry Applications

- » Aerospace & Defense
- » Agriculture & Mining
- » Automotive & Transportation
- » Chemicals
- » Computers & Electronics
- » Consumer Products
- » Energy & Utilities
- » Manufacturing & Warehousing

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