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Fabrication of Zirconium Oxide Thin Films by Spray Technology

Zirconium Oxide is an extremely versatile ceramic material with unique structural, optical, and electrical properties. It resists high temperatures, corrosion, wear, and impact. It is also chemically inert to most substances, even at elevated temperatures. The main use for thin films of Zirconium Oxide revolves around its resistance to chemical reactivity and its ability to act as an electrolyte for oxide mobility, which is used in solid oxide fuel cells. There is a growing interest in research on thin-film deposition of zirconium oxide, because of its physical and chemical properties. Therefore, a spray-on procedure has been developed that allows for the fabrication of zirconium oxide thin films on various substrates at low temperatures. Further, solid particles and dopant materials can be added to the solutions and these particles and dopants become imbedded in the metal oxide films. This, the particles and dopants alter the properties of the thin films.

The University of Toledo is seeking a company interested in utilizing this low temperature spray-on procedure for coating a substrate with zirconium oxide (ZrO_2). By altering the starting product, the fabrication process described allows for a wide range of applications including: chemically resistant coatings for photovoltaic devices, a water sheening layer for windows, an ion blocking layer for windows, a backside contact material between the semiconductor and the metal electrode, to fabricate monolithic solid oxide fuel cells.

Applications:

1. Photovoltaic devices
2. Solid oxide fuel cells
3. Optical engineering
4. Integrated circuits
5. Practical applications

Advantages:

1. Low temperature disposition
2. Solid particles and dopants may be added to the process to alter the properties of the thin films
3. Applicable where previous technologies have been restricted
4. A multitude of substrates can be coated for use in various applications

Contact

The University of Toledo
Office of Research Development
MS 1034
3000 Arlington Avenue
Toledo, Ohio 43614

Phone: 419-383-6963

E-mail: stephen.snider@utoledo.edu

