9-2010-2490 | Nanoparticle Coatings Based on Hydrogen Peroxide Sol-Gel Processing of Metal Oxides

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Background

- Antimony tin oxide is one of the most widely used transparent conducting oxides, mainly because of its two chief properties: electrical conductivity and optical transparency, which are important for optoelectronic devices, such as in flat-panel displays and solar cells.
- Current methods for particle and nano-particle tin oxide formation&surface coatings employ acidic media. However, the important need of coating acid-sensitive materials with nano-particulate antimony-doped tin oxide (ATO) films is still a challenge.

Our Innovation

Novel, Generic method for the coating of different surfaces, including acid-sensitive crystals (LiNbO3 and calcite) from an organic, ligand-free, stable hydroperoxostannate and -antimonate solution. This enables coating of minerals and acid-sensitive materials with conductive film.

Key Features

- This method is useful for coating small entities since the ATO nano-particle formation takes place exclusively on surfaces, with no particle growth taking place in the solution.
- Uniform coating of different clays and other irregular configurations by monosized 5 nm ATO particles was demonstrated from an organic ligand-free solution.

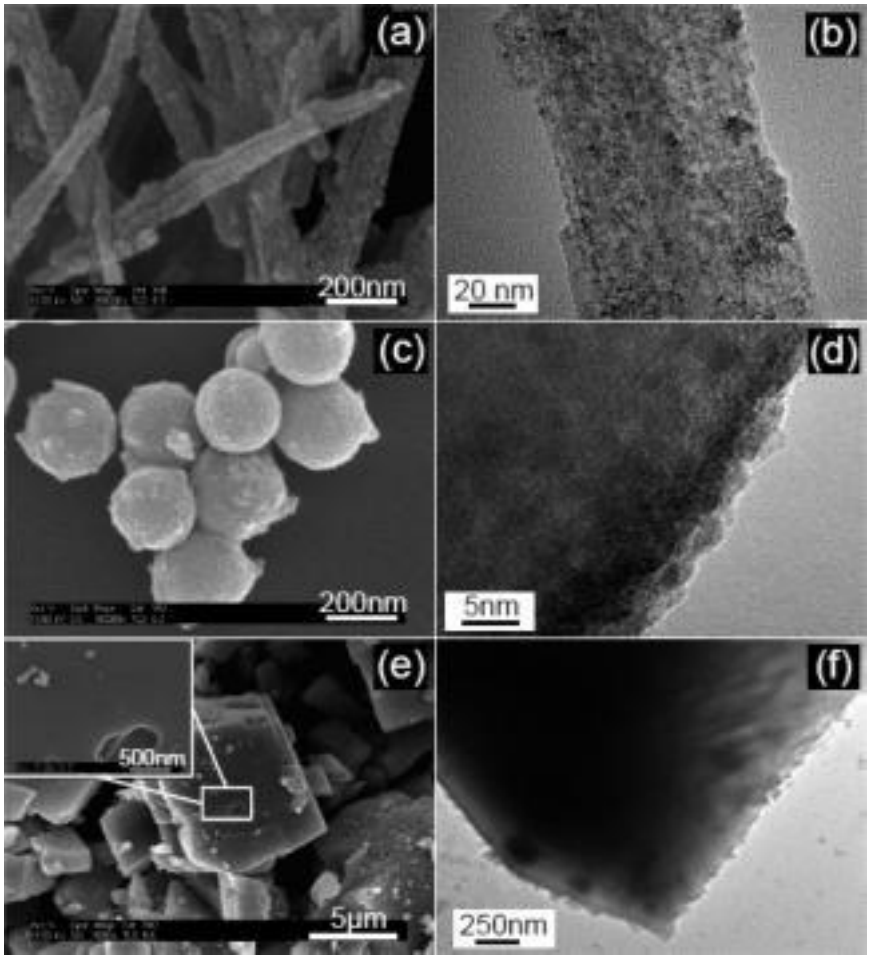

Figure: SEM (left) and TEM (right) micrographs of ATO-coated sepiolite (a and b),

porous sol-gel silica powder (c and d), and calcite (e and f). Five nm crystalline ATO particles are visible in the TEM figures.

The Applications

- Doped tin oxide coatings can be employed for sensors, catalysis, smart (heated) windows, touch panel displays, voltage-dependent resistors, and LED devices, as well as solar cells and especially polymer solar cells.

Development Milestones

- Seeking for Industry cooperation

Patent Status

Granted US 10,119,036

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