Plant-derived component assisted growth of porous ceramic thin films.

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Background

- Needs for controlling depth profile of thin films.
- High cost for the vacuum process.

Aim

- Depth profile control of thin films without vacuum process.
- "Dip and burn" process only.

Advanced Research Topics

Plant-derived additives induces porous ceramic thin films during heat treatment. Proper sequential desorption of additives could provide ceramic thin films with fractal structure. It is also expected to provide thin films with gradient structure in the depth profile.

In this study, porous titanium dioxide ceramic thin films are grown by "dip and burn" process by (NH4)4[Ti2(C6H4O7)2]4H2O water solution. Various plant-derived additives are tested whether they produce pores in ceramic thin films during firing process. The diameter of the pores are the key factor of this process and microscopically evaluated.

Since the main starting material for this wet coating process is the "water solution" of (NH4)4[Ti2(C6H4O7)2]4H2O, aqueous additives could provide smaller and oily additives could provide larger pores.

Publications

- Japanese Patent No. 5669255, Growth process of transparent porous ceramic thin films.

Applied area and future prospects

- Optical thin films
- Catalytic thin films

Issues for technology transfer

- Hardness and strength of thin films
- Controllability of depth profile