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Development of functional thin film fabrication techniques using mist droplets for fabricating high quality thin film under open-air atmospheric pressure

Project Leader

Toshiyuki Kawaharamura, Dr. Eng.

Associate Professor

Center for Nanotechnology, Research Institute, Kochi University of Technology

Intelligent Mechanical Systems Engineering, Kochi University of Technology

Faculty Members Involved in this Project

Toshiyuki Kawaharamura, Dr. Eng.

Associate Professor

Center for Nanotechnology, Research Institute, Kochi University of Technology

Intelligent Mechanical Systems Engineering, Kochi University of Technology

1. Objective

This project is aimed at:

Using an atmospheric pressure thin film fabrication technique such as the solution process, damage-less thin film can be grown and the environmental load is less than that using the conventional vacuum process. However, it is impossible with the conventional solution process to prepare high quality thin films, which can be used and developed for the high performance devices. Thus, I focus on control of reaction and control of precursor behavior and have been developing a thin film fabrication technique called mist CVD.

2. Project Outline

To that end, the project will consist of the following phases:

- (a) Functional thin film fabrication and evaluation
 - Oxide materials: High-k insulator (AlO_x, YO_x, SiO_x...)
 - Wide band gap semiconductor (ZnO, Ga₂O₃, IGZO, ZTO...)
 - Electrode (ITO, Al:ZnO, Sn:Ga₂O₃...)
 - Metal: Cu...
 - Organic: PEDOT...
- (b) Fabrication of high quality thin film for next generation devices
- (c) Analysis of reaction mechanism
- (d) Analysis of precursor behavior in the reaction field

3. Expected Performance

In this project, the successful candidate would be expected to:

- (a) Overwhelming reduction of energy consumption of electrical device fabrication factories.
- (b) Development of novel reaction processes
- (c) Realization of novel technologies

4. Required Skills and Knowledge

The successful candidate for this project will have the following knowledge and skills:

- (a) Tough mind
- (b) Full of intellectual curiosity.
- (c) Executive ability
- (d) Physical Chemistry
- (e) Chemical (Reaction) Engineering
- (f) Quantum Physics
- (g) Fluid (Thermo)dynamics
- (h) X-ray

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Contact

E-mail: kawaharamura.toshiyuki@kochi-tech.ac.jp