


<b>Developing Green Chemistry using a Three-Dimensional Ball Mill</b>		
<b>Tomoaki ENDO</b>		
<b>Professor</b>	tendo@sendai-nct.ac.jp	
<b>Affiliated Societies</b>	Chemical Society of JAPAN, AAAS, Electrochemical Society of Japan, American Chemical Society	
<b>Keywords</b>	Environmental materials and recycle technology-related (64030), Organic functional materials-related (35030), Structural organic chemistry and physical organic chemistry-related(33010)	

### Research Topics

- Synthesis of new types of organic functional materials
- Mechanochemistry using a three-dimensional ball mill
- Development of a computer chemistry system

### Research Seeds

The ultimate purpose of our research is contribution to the sustainable development of the Earth to produce useful new functional materials.

Recently, an excellent new style ball mill (Fig. 1: "Three-dimensional ball mill (3D-BM)") has been developed by a small firm. It is known as a Nagao System<sup>1)</sup> in Japan. The 3D-BM has two rotation axes, which means that it allows those balls to move in three-dimensional space in the ball mill's cell, with such milling, it can eliminate friction heat over a long milling time. For that reason, it reduced heat damage to the sample during milling processes.

We are now applying 3D-BM to various organic chemical reactions. Additionally, we are developing the simulation program for 3D-BM using the "Distinct Element Method" to elucidate the 3D-BM's characteristics.

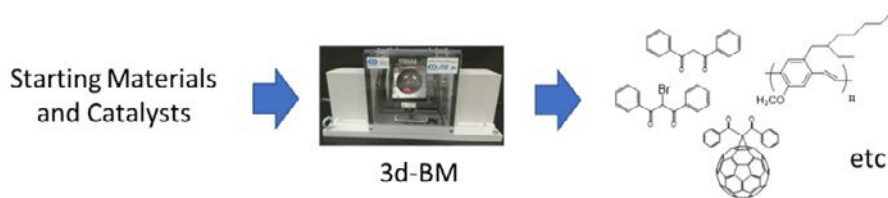


Fig. 1. Utilization of Three-dimensional Ball Mill.

This machine is effective not only for pulverization but also for agitation of highly viscous substances. We would like to develop a new excellent mechanochemistry as a tool for "Green Chemistry".

- 1) <http://www4.plala.or.jp/nagaosystem/> (2018.08.01)

### Related Technology

- Synthesis of fullerene derivatives, OPV materials, OLED materials, etc.
- Spectroscopy of NMR, UV-Vis, FT-IR, LC-MS, fluorescence and CV, etc.
- Molecular design: structure-property relation, molecular orbital calculation, molecular dynamics simulation