Developing Materials and Components with New Possibilities

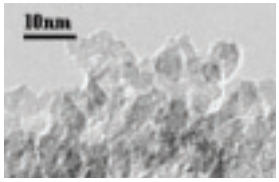
“New quality electronics begin with new quality components, which begin with new quality materials.” This means that to develop new functions or technologies we must consider materials anew. Murata takes this approach not only in product development, but in waste handling as well. Here we introduce CO_2 absorption ceramics developed through our research on waste as a “material.”

Research into Recycling

At our Materials Research & Development Center, research has been in progress to recycle ceramics waste as a material with high functionality.

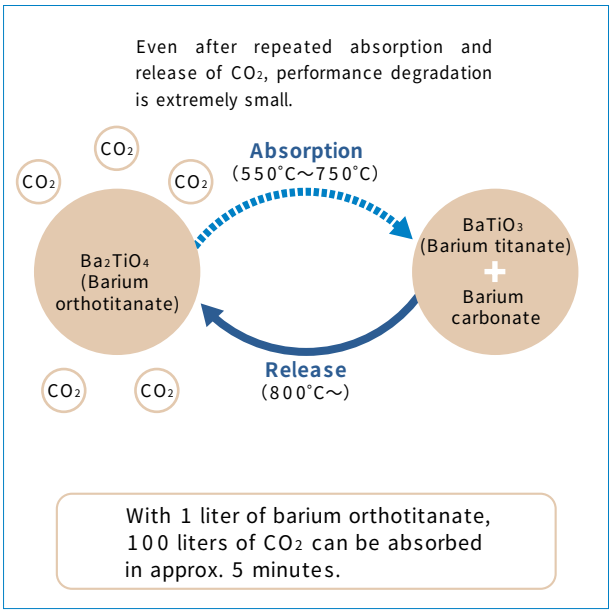
Conventionally, ceramics waste generated during manufacturing processes of various electronic components have been recycled via waste disposal companies into cements and roadbed materials. To make effective use of ceramics as a high-value added resource, ceramics should be recycled as a material with higher functionality. Based on the principle " new quality electronic equipment begins with new quality components, and new quality components begin with new quality materials, "we have implemented research and development of recycling methods focusing attention on the functions of the material itself.

Specifically, we have worked on the synthesis of titanium oxide fine particles for photocatalysts and the development of a CO_2 absorption ceramics using barium titanate ($BaTiO_3$), a material for producing ceramic capacitors, which are among Murata's key products. While striving to put these technologies into practical use, in the future we will promote research and development to enable recycling of other types of ceramics waste besides barium titanate.



Barium titanate fine particles synthesized from ceramics waste (microgram taken by transmission electron microscope)
(1 nm = 1 billionth of a meter)

Mechanism of CO_2 absorption



Discovery of a New CO_2 Absorption Ceramics

As a result of our research, we found that barium orthotitanate (Ba_2TiO_4), which is formulated from barium titanate, has a property that effectively absorbs and releases carbon dioxide (CO_2) at high temperatures. This CO_2 reaction is reversible and therefore can be used repeatedly.

Barium orthotitanate is stable when used at high temperatures, and has a property of withstanding this condition over a long period of use. Moreover, we have begun to see that it has high desulfurization performance as well.

We believe that the discovery of this material is very innovative since it paves the way for the effective use of waste materials. The material can also help clean the atmosphere through CO_2 reduction, a task urgently needed in promoting global environmental protection.

Future Challenges

One characteristic of this CO_2 absorption ceramics is that it can absorb carbon dioxide in a higher temperature range than ever before. It should therefore not be incorporated into existing systems. Instead, we need to design a new CO_2 collection system for these. Meanwhile, it is likely that this CO_2 absorption ceramics will find various applications in more fields than previously thought. With these aspects in mind, we will seek ways to put this new material into practical use.

Application to CO_2 collection systems