TOYOHASHI UNIVERSITY OF TECHNOLOGY
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Feature

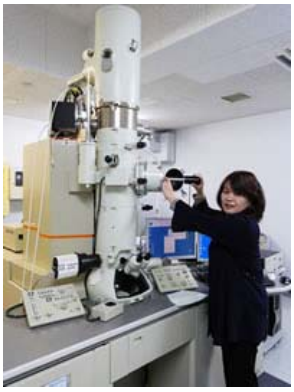
Focus on ceramics

Though much underappreciated by the layman, ceramic materials play a vital role in modern manufacturing and are found in thousands of products including the brakes on cars, knives, and electronic devices. In her role as a materials scientist, Hiromi Nakano in Toyohashi Tech's Cooperative Research Facility Center, is investigating ways to study and control the interaction of ceramic material properties using transmission electron microscopy (TEM), which enables analysis of the structure of materials on the atomic scale.

"Because the important characteristics of ceramic materials arise from the material's structure at the smallest level, we can use the transmission electron microscope to conduct analysis at the level of their atoms," says Nakano. "In this way we are able learn how to control the mechanisms of these properties, which can lead to the design of new materials."

In one set of experiments, she conducted in-situ TEM observations of ceramic oxides placed at high temperatures. By observing the changes taking place in materials under heating, she observed the conditions that led to the disappearance of pores. In addition, she was able to observe the process of grain growth, thereby gain insights into the thermal behavior of the nanoparticles.

"By making long-term observations of the crystallization process and grain growth of these oxides, we were able to clarify the mechanism behind the formation of naonocrystaline particles," says Nakano. "This has resulted in our proposing a new theory of grain growth in ceramics."



Hiromi Nakano in Toyohashi Tech's Cooperative Research Facility Center