

## A Materials Research Science and Engineering Center Program Highlight

### *Painting a Microscopic Picture*

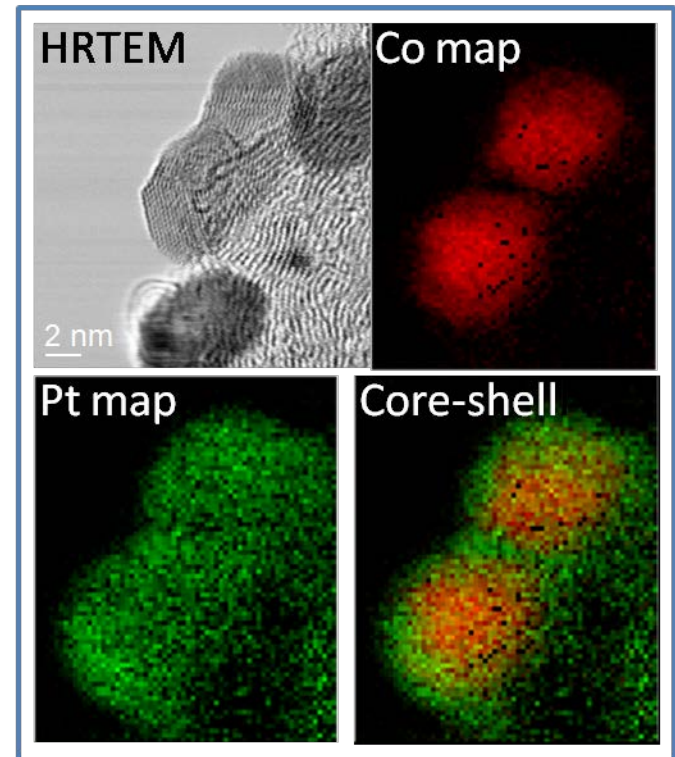
#### A New Microscope Color-Codes Atoms in Nanostructures

Most electron microscopes give basic structural information — the size and shape of small objects — but little chemical information. For example, the gray-scale image at right (labeled “HRTEM”) is an image of a new fuel-cell catalyst under development by General Motors. But is this catalyst conventional platinum or something more interesting?

To answer questions like this, industrial researchers can go to the Shared Facilities at Cornell University to use the new “UltraSTEM” (scanning transmission electron microscope) — the first of a new generation of electron microscopes designed for chemical analysis at the atomic scale.

In the “Co map” at right, the researchers zoomed in on two catalyst particles and asked the microscope to show only the cobalt atoms, which are color-coded red. The researchers then imaged the same region asking the microscope to show only platinum atoms, which are color-coded green in the “Pt map.” When these data are displayed on the same image (“Core-shell”), the chemical structure of the particles is revealed. In this case, the particles have a cobalt “core” that is coated with a platinum “shell.”

This is one example of how NSF’s investments in advanced instrumentation benefit both universities and industry.



Images from an advanced electron microscope show that GM’s new fuel-cell catalyst resembles nanoscale M&Ms, having a cobalt core (red) surrounded by a platinum shell (green).

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*For more details, visit the Cornell Center for Materials Research website at*

<http://www.ccmr.cornell.edu/news>