Finding ancient minerals for high-tech uses

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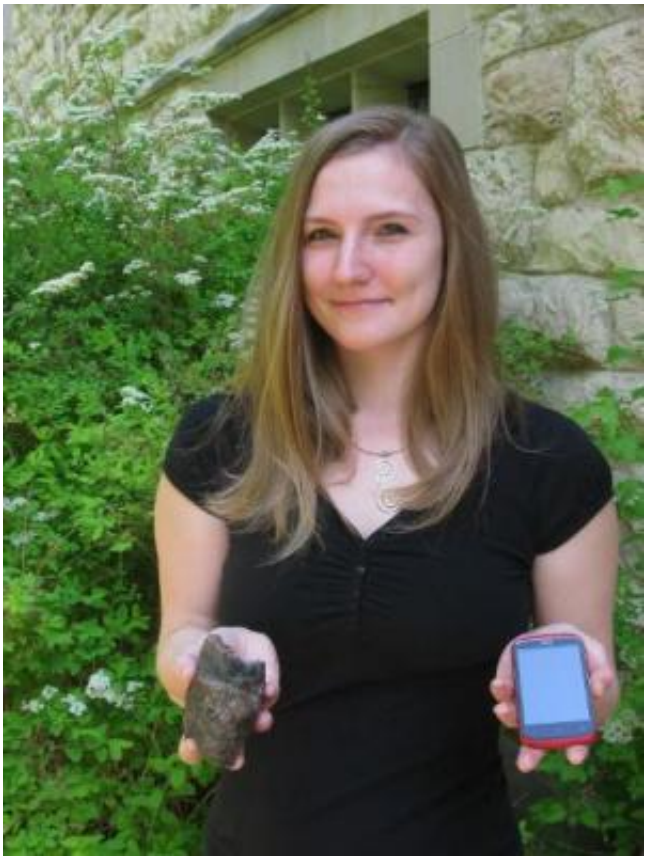

Krisztina Pandur studies some of today's most in-demand minerals. Credit: Thomas Onion

As demand for high-tech devices and green technologies rises, countries around the world are scavenging for sources of rare earth elements—the expensive metals required in everything from iPods to hybrid cars.

China currently supplies over 90 per cent of the world's rare earth elements and recently began driving up prices by restricting exports. With a major deposit at Hoidas Lake, 60 kilometres north of Uranium City, Saskatchewan is poised to enter the rare earth element market.

University of Saskatchewan geology PhD student Krisztina Pandur is examining the formation of both the Hoidas Lake deposit and another site at Douglas River. Her research is the first in-depth study of the unique deposit type found in Saskatchewan and will help determine whether more discoveries of the lucrative metals can be made in the area.

Pandur has found that Saskatchewan's rare earth elements are very different from other sites around the world because they were transported by hydrothermal fluids and not just magma, molten rock that forms lava when erupted from volcanoes. Magma is the commonly studied transporter of rare earth elements.

"We don't see a magmatic source in the area, so we don't know where the rare earths come from. Finding the source is one of the big challenges of this project," she says.

Her supervisor Kevin Ansdell says there may be other places in Saskatchewan "where we should be looking for rare earth elements but haven't because we didn't understand how they form."

Despite their name, rare earth elements are quite common. What is rare is finding deposits with a high enough concentration of the elements to make mining economically viable.

"The Hoidas Lake deposit is one of the most significant rare earth element resources in North America," Pandur says, adding that extremely high proportions of neodymium (Nd) make the site of great

interest to the magnet industry.

Permanent magnets are an essential part of green technologies such as wind energy turbines.

"This research addresses our need to understand and find minerals that contain elements that are vital for our high-technology, and hopefully, more sustainable lifestyles," Ansdell says.

Pandur made her discoveries by examining rock samples about as thick as a human hair. She found microscopic bubbles called fluid inclusions leftover from when the rock was forming almost two billion years ago.

"If you look at these little bubbles in the rock, you can see what the fluid was like. They basically preserve the environment at that time," she says.

By heating and cooling the rock, Pandur used these bubbles to determine the composition, temperature and depth of the fluids that carried the rare earth metals.

This is the kind of detective work needed to further locate rare earth elements.

"I consider this research an exciting riddle and I try to put together the pieces without rest until I get to the solution," she says.

"It is a great opportunity for me to develop my skills and build my scientific career."

Provided by University of Saskatchewan

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