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For Immediate Release
August 24, 2010 | 85-10

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Two Laurier professors receive prestigious Early Researcher Awards

WATERLOO – Two professors in Wilfrid Laurier University's Faculty of Science have been awarded prestigious Early Researcher Awards from Ontario's Ministry of Research and Innovation.

Psychologist Nancy Kocovski and chemist Vladimir Kitaev have each been awarded $100,000 over a five-year term to facilitate their innovative research. Each professor will also receive a $50,000 matching award from Laurier.

The title of Kocovski's research is "Mindfulness and Acceptance-Based Treatments for Social Anxiety: Mechanisms of Action."

Social anxiety, Kocovski says, is experienced by people who are concerned about being judged by others. It goes well beyond shyness or fear of using the telephone. At extreme levels, it is diagnosed as social anxiety disorder. It can be extremely debilitating.

"My recent research has focused on the development and validation of mindfulness- and acceptance-based group therapy for social anxiety," Kocovski says.

"It's about being in the present moment and being willing to experience your anxiety in order to live your life."

Another method of treating social anxiety disorder is cognitive behaviour therapy, "which is about changing your thoughts." Kocovski is currently running a study comparing the two treatments.

"The aim of the proposed research is to identify how mindfulness approaches to treatment work in reducing levels of social anxiety, based on data from patients currently undergoing treatment, and also in laboratory studies with students and community volunteers," she says.

The title of Kitaev's research project is "Nanostructured Materials for Advanced Optical Applications via Synthetic Control and Self-Assembly of Nanoscale Building Blocks." Nanoparticles are extremely small — a nanometre is one billionth of a metre.

Kitaev and his students have produced several well-defined nanoshapes including cubic, decahedral (10-sided) and pentagonal rod silver particles. The importance of this is that "metals at nanoscale, with a uniform shape, have well-defined optical properties."

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To visualize what this means, think of an opal. Gemstone opals contain spheres of silica, about 150 to 300 nanometres in diameter, organized in a tightly packed hexagonal or cubic lattice. These ordered spheres of silica produce the sparkling colours that make gemstone opals so beautiful. They do so by interfering and diffracting the light that passes through the opal's ordered microstructure.

Kitaev and his students aim to create something similar using their silver nanoparticles.

To demonstrate, he produces a vial half-filled with aqueous solution containing nanoscale particles of silver. If you look at direct sunlight through the vial, the liquid is reddish. If you look at reflected light through the vial, the light is greenish. You can control the colour by controlling the conditions of synthesis to produce all the colours of the rainbow. It will change colour in the presence of targeted chemicals.

These optical properties — Kitaev has coined the term "nanorainbows" — have great potential. Nanoscale metals could be used in optical sensors to, for example, "detect proteins, DNA or whatever you want by appropriate nanoparticle modifications."

Kitaev's research has been funded by a Natural Sciences and Engineering Research Council Discovery Grant. In his case, discovering nanorainbows really was a discovery: "We left the solution on the windowsill and it became bicoloured. Then we had to find out why. After one year of research we were the first to report on silver decahedra. We became greatly fascinated by and involved in the beauty and science of metal nanoparticles.

"With this ERA funding, producing ordered materials for use in sensors and optical application becomes possible."

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