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U of L chemistry student's research published in top tier journal

University of Lethbridge master's student Daniel Stuart, in collaboration with Drs. Michael Gerken and Stacey Wetmore, have cracked the case of the vanishing compound.

Their research results were recently published in *Angewandte Chemie*, a top-notch, peer-reviewed scientific journal, and subsequently featured in a Research Highlight in the journal *Nature*.

During common chemical reactions, some organic compounds are created but they disappear in the flicker of an eye. While scientists have made these compounds in a solution before, the U of L team from C-CRAFT (Canadian Centre for Research in Advanced Fluorine Technologies) is the first to successfully create these compounds in a solid state.

"The isolation of these intermediates in the solid state is highly significant," says Gerken. "Daniel's results show the structure of molecules that have been written on the white board in every advanced organic chemistry class around the world. The collaboration with Dr. Wetmore is a prime example of the synergy with C-CRAFT, providing students with optimal training and research opportunities. I am very proud of Daniel; he has done a great job in preparing and characterizing his molecules, as well as supporting his results with computational results."

"I started studying these systems based on another project I was working on," says Stuart. "I was doing a reaction and normally, I see my reactions start to decompose, they go brown and nasty things happen and my reaction is essentially ruined. I did one and it worked out fine. It was very fishy and I couldn't explain it. I started to do some work and lo and behold, I was able to start growing crystals."

Drawing from previous work done by Nobel-prize winner Dr. George Olah, the researchers nailed down the disappearing compounds by conducting the reactions in baths of pure acid. The reactions created solid deposits that were studied further using an X-ray diffractometer and spectroscopy.

“Dr. Wetmore really helped us learn more about the bonding in these molecules, carrying out calculations and determining energies,” says Stuart. “She helped us further confirm what was going on.”

“Computational chemistry uses computers to gain information about molecules at the atomic level,” says Wetmore. “This research project provides a wonderful illustration of how chemists can use powerful computers and sophisticated lab techniques to understand how atoms bond. Daniel is a very smart student and quickly learned how to do the calculations necessary for his project.”

The research finding has helped clarify what happens in these reactions at a fundamental level. Ultimately, the results could be used to improve and modify conditions in reactions that are used in industry or in the development of pharmaceuticals.

“This is definitely the highlight of my master’s; it is really exciting work,” says Stuart. “I’m really grateful I was able to work in Dr. Gerken’s lab and get his support and advice in this project. I’d also like to thank Dr. Wetmore for her help with modelling these systems — she was fantastic.”

Stuart came to the U of L after he met a former graduate student of Gerken’s while completing his undergraduate degree at McMaster University in Hamilton.

“We have some of the best instrumentation in North America and the opportunities for undergraduates here are phenomenal,” says Stuart. “They get hands-on experience and those opportunities are really hard to come across at bigger institutions.”

This news release can be found online – [Chemistry research published in top tier journal](#).

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