Raman spectroscopy provides high-tech clues to Group of Seven's Lawren Harris art mystery

By **Roberta Staley**

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Group of Seven artist Lawren Harris painted Hurdy Gurdy (right), owned by Vancouver art collector Tony Ma and valued at more than $1 million. Raman spectroscopy was used to try to determine whether Autumn Harbour (left) could be another of Harris' creations, painted during one of his many sketching trips into the Ontario wilderness.

Fourteen years ago, David Robertson of Delta, British Columbia was holidaying in Ontario when he stopped at a small antique shop in the community of Bala, two hours north of Toronto in cottage country. An unsigned 1912 oil painting caught his attention. Thinking it evocative of a Group of Seven painting, Robertson paid the asking price of $280 and took it home to hang above his fireplace.

The idea that this might be a Group of Seven painting grew in Robertson's mind, and he embarked upon an odyssey to discover its creator. The painting, which Robertson christened Autumn Harbour, showed a sloop moored in Go Home Bay near Georgian Bay in Ontario. The area is famed as a favourite sketching haunt of Group of Seven member Lawren Harris, whose abstract landscapes sell today in the seven figures. Increasingly convinced his painting might be a genuine Harris, Robertson set out to find proof. He was disappointed when a Vancouver Art Gallery senior curator dismissed the possibility that Autumn Harbour was genuine. Undaunted, Robertson took the painting to Ottawa to the National Gallery of Canada. The head curator for Canadian art couldn't definitively say if the painting was or wasn't genuine, and suggested that an expert directly compare Robertson's painting with a known Harris.

This past June, the opportunity to do just that came about. The 97th Canadian Chemistry Conference and Exhibition in Vancouver was offering a Raman spectroscopy workshop, organized by Kelly Akers, president of ProSpect Scientific, which distributes Renishaw (Canada) Raman microscopes. The art world is increasingly utilizing Raman spectroscopy as a tool to analyze the composition of paint pigments as a means of analyzing and restoring old paintings. As luck would have it, there was a local Harris, titled Hurdy Gurdy, which had been bought for $1.1 million at auction by Vancouver businessman and Canadian art collector Tony Ma. Regarded as the most Impressionist of Harris' works, the 1913

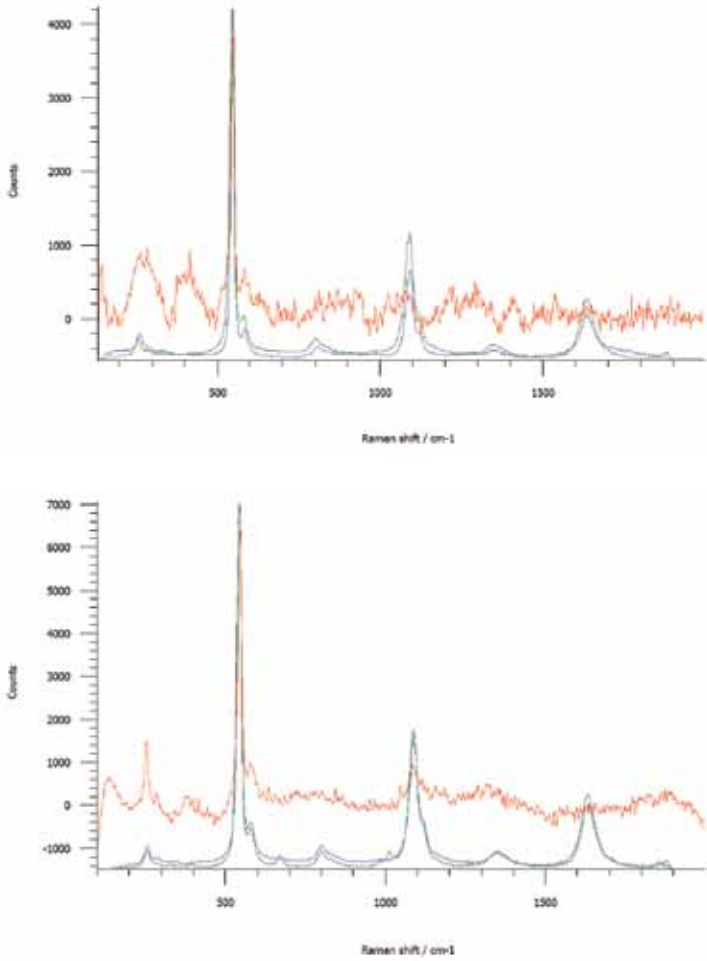
oil painting shows a mother pushing a pram in Toronto's Ward district. Ma agreed to have his painting compared to Robertson's using Raman spectroscopy, which would elucidate the composition of the paint pigments in both works of art, bringing Robertson one step closer to knowing if his instincts were correct. Robertson was convinced before the testing began that similarities would be found, noting that the two paintings had a similar colour palette, most significantly a sublime use of purples.

To ensure that the paintings wouldn't be damaged and to capture precise computerized paint pigment signatures, Akers brought in respected spectroscopy applications engineer Richard Bormett, who is the Raman business manager of Renishaw Inc. in Illinois. To minimize any risk of damage, paint signatures from both Hurdy Gurdy and Autumn Harbour were obtained using a laser power of less than 0.5 milliwatts on areas of blue and white paint. Once the signatures were recorded, they were then compared to Renishaw's large database of minerals. In both paintings, Bormett found traces of lapis lazuli, a semi-precious stone that, when purified, was used around the turn of the 20th century to make natural ultramarine blue pigments. When Bormett analyzed the white paint in Autumn Harbour, he found that it contained anatase TiO_2. The white pigment in Hurdy Gurdy, however, was composed of hydrocerussite. This discrepancy, however, didn't rule out the possibility that Autumn Harbour was a Harris, says Bormett, since both TiO_2 and hydrocerussite were in common use among artists in the early 20th century.

As useful as it is, spectroscopy can't be solely relied upon to authenticate works of art, Bormett adds. It can identify a fake, but it can't definitively confirm a painting's creator — only its age and the types of paints the artist used.

Raman spectroscopy was discovered in 1928 by Venkata Raman, who won a Nobel Prize two years later for his work. Raman spectroscopy records the distinctive "signatures" that result when molecules scatter monochromatic light, as produced by today's lasers. With works of art, the Raman spectroscopy process involves illuminating a tiny area of paint with a low-intensity laser beam. A very small amount of light is scattered by the sample at a slightly different frequency, which occurs because energy is transferred from the light to the molecule. The molecule is left vibrating and the amount of energy transfer corresponds to the vibration, which is represented by a peak in a Raman spectrum displayed on a computer screen.

RENISHAW (CANADA)



Paint "signatures" from Hurdy Gurdy (top) and Autumn Harbour (bottom) were obtained using a laser power of less than 0.5 milliwatts on areas of blue. In both paintings, traces of lapis lazuli were found, proving that blue paint from the same era was used in both paintings.

The applications for Raman spectroscopy go far beyond analyzing paintings and include the pharmaceutical, materials science and nanotechnology sectors, among others. However, it is the world of art where spectroscopy has stirred up the most attention and controversy. Several years ago in Italy, for example, spectroscopy helped pinpoint the age of the Shroud of Turin by determining the flax fabric degree of oxidation in the linen fibre. This made it possible to determine the age of the fabric, thus proving that it originated around the same time that Jesus Christ's body was wrapped in linen following crucifixion. Nonetheless, many religious and art experts insist that the shroud is a fake.

In the end, Raman spectroscopy was unable to establish that Autumn Harbour is a Group of Seven painting. But that didn't change Robertson's mind. "I know this is a genuine Harris," he insists.