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### **Non-invasive and non-destructive quantification of wollastonite in limestones using Raman spectroscopy**

Wollastonite is an economically important mineral that is used to manufacture plastics, ceramics and other products. Finland is currently among the top producers of wollastonite in the world, and the largest in Europe. Finnish wollastonite is sourced from the Ihalainen deposit in Lappeenranta, southeastern Finland. Here, wollastonite is extracted from Paleoproterozoic (1.9 Ga) limestones that also host industrial-grade calcite. Processing of these rocks requires certain mineralogical compositions (e.g.: 21% of wollastonite) that determine the processing quality of the rock. Currently, labor-intensive laboratory analytical technology is commonly used for the mineralogical characterization of rocks. Laser-spectral methods have the potential to partially replace such technologies, and for this end, Raman offers a fast, non-invasive and non-destructive alternative.

To test the ability of the Raman technology to classify wollastonite-bearing limestone rocks into different quality categories, three samples were acquired from the Ihalainen deposit and these samples were scanned using a Raman setup. Different data analysis methods were then applied to map the spatial distribution and relative abundances of the minerals. The results were validated using the scanning electron microscopy (SEM) system of the Geological Survey of Finland.

The preliminary results suggest that the relative quantity and the spatial distribution of wollastonite can be mapped using high spatial resolution Raman data. The ongoing study will next focus on acquiring more samples from the study area, and using these samples, to further test the potential of Raman for the detection of the processing quality of rocks.