

Tracking REE formation with fluid inclusions from the Gallinas Mountains, NM

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Rare earth elements (REE) are mined for use in electronics, from digital cameras and LED lights to electric cars. Large quantities of REE are also used in renewable energy technologies for example solar panels and wind turbines. The future demand for REE for use in technology makes research on REE mineral deposits critical to avoid a supply shortage. The United States is actively searching for more sources of REE in mining and battery recycling. If we understand better how these resources form, we can look for more specific indicators to target REE deposits. Here, we are investigating fluorite-hosted fluid inclusions from the Gallinas Mountains, which is a REE-fluorite-barite vein and hydrothermal/volcanic breccia deposit located in New Mexico. The Gallinas Mountains were re-evaluated for REE in 2010, and bastnaesite and fluorite found in Gallinas breccia pipes were revealed to be REE-rich (McLemore, 2010). The focus of this work is on fluorite-hosted fluid inclusions, which provide information on fluid chemistry and mechanisms of REE transport and precipitation in the REE mineralized veins. This information will provide a better understanding of how REE deposits form and may even provide better strategies for future exploration.

We have found three generations of fluorite using cathodoluminescence (CL) imaging, which are early euhedral green to later euhedral blue, and a cross-cutting fine grained purple fluorite. Two types of two-phase vapor and liquid fluid inclusions were identified. In the green growth zones of the early fluorite, inclusions exhibit 30-40 vol% vapor and in the later, purple fluorite fluid inclusions have 5-15 vol% vapor. Differences in phase proportions (i.e., vapor to liquid ratios) at ambient condition indicate variable entrapment conditions, which generally show a cooling trend from early to late fluorite generations. Next, we will continue conducting microthermometry to determine the salinity of the fluid inclusions hosted in the different fluorite generations and measure the compositions of the fluid and their inclusion using RAMAN spectroscopy.

REFERENCES

McLemore, V., 2010, GEOLOGY AND MINERAL DEPOSITS OF THE GALLINAS MOUNTAINS, LINCOLN AND TORRANCE COUNTIES, NEW MEXICO; PRELIMINARY REPORT: NMBG, Open-file report OF-532, 3 p.