

Gem Notes

COLOURED STONES

Characterisation of Almandine from Idaho, USA

Idaho garnets are best known within the gem trade as the asteriated almandine that is the state's official gem. Although gem-quality material has been recovered from placer deposits in northern Idaho for more than a century (Shannon 1922), faceted Idaho garnets have rarely been available in consistent commercial quantities. This changed recently when Columbia Gem House (Vancouver, Washington, USA) established a reliable supply of fine faceting rough for cutting calibrated shapes and sizes, marketed as 'Clearwater Rhodolite' (Figure 1). The material was stockpiled from earlier mining activities in the Emerald Creek area, which has also produced star garnets.

The garnets originate from Precambrian garnet-bearing schists of the Belt Supergroup in northern Idaho (West 2005; Zirakparvar *et al.* 2010), where weathering has concentrated gem-quality material in placer deposits. Previous articles have documented the chemical composition of Idaho garnets (West 2005) and their gemmological characteristics (Dunn 1975),

identifying them as almandine. This study presents the standard gemmological properties together with Raman and ultraviolet-visible-near infrared (UV-Vis-NIR) spectroscopy and energy-dispersive X-ray fluorescence (EDXRF) chemical analysis of the commercially available faceted Idaho garnets, providing an updated reference for gemmologists and the jewellery trade.

Columbia Gem House supplied 329 faceted Idaho garnets for examination that weighed a total of 144 carats. The suite represented a selection of the recent production, ranging from calibrated round and princess cuts of 2 mm to oval and emerald cuts as large as 12 × 10 mm (up to 6.18 ct), and some pear and marquise cuts. All the stones were transparent and eye clean. Their colour was a remarkably consistent deep purplish red; very subtle variations can be seen in Figure 1. The larger stones displayed somewhat darker tones.

The RI measured with a Krüss refractometer gave a mean value of 1.783 from multiple samples, consistent with almandine and near the boundary with pyrope-almandine (1.785) proposed by Stockton and Manson (1985). Hydrostatic SG measurements on the larger stones consistently yielded a value of 4.19. Smaller gems, particularly the 2 mm melee, were readily attracted to an N52 neodymium magnet, consistent with the high Fe content characteristic of their predominantly almandine composition. Examination with a handheld diffraction-grating spectroscope revealed a typical almandine absorption spectrum (cf. Stockton & Manson 1985). No fluorescence or phosphorescence was observed under long- or short-wave UV radiation.

Examination with a standard gemmological microscope revealed primarily parallel fluid inclusion trails (Figure 2a), as well as numerous negative crystals, some with excellent definition, but most somewhat resorbed. Some stones contained clusters of colourless crystals and black specks (Figure 2b), which were possibly apatite and ilmenite, respectively, as reported by Dunn (1975).



Figure 1: These faceted Idaho garnets are representative of the collection of 329 stones examined for this study. The calibrated-cut garnets shown here include 3 mm princess cuts, 4 mm and 7 mm marquise shapes, 6 mm and 10 mm round brilliants, and 9 × 7 mm pear and emerald-cut gemstones. Photo by Hannah Pepper, Stuller Inc.

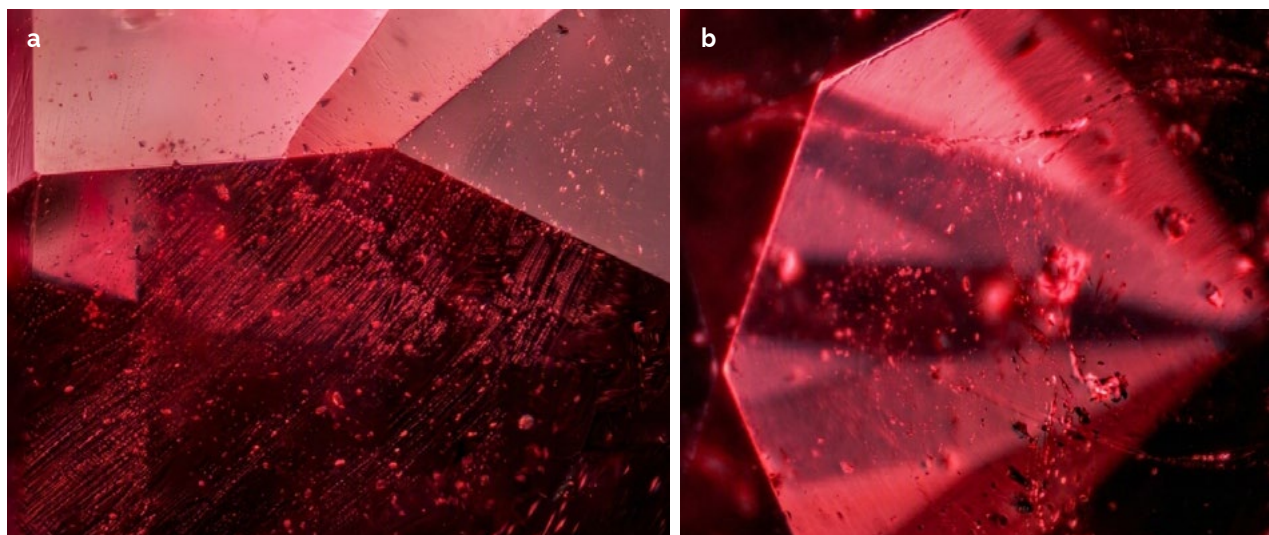


Figure 2: Common inclusions in the Idaho almandine consist of (a) fine parallel fluid inclusion trails, and (b) colourless and black crystals (the latter visible towards the bottom of the image). Photomicrographs by C. Evans; image widths (a) 5.0 mm and (b) 1.5 mm.

Raman spectroscopy was conducted on nine samples with a Magilabs GemmoRaman unit equipped with a 532 nm laser. The spectra showed the principal garnet bands in the 350, 550 and 900 cm^{-1} regions, consistent with almandine-rich pyrospite garnet (Kolesov & Geiger 1998; Serov *et al.* n.d.). No anomalous features were observed, and the four major peaks matched well with the spectrum of a near-end-member almandine in the RRUFF database (<https://www.ruff.info/R040079>).

EDXRF analysis confirmed the major garnet component to be almandine (around 85–90 mol%). Low Mg and Mn, and trace Ca, indicated only minor pyrope, spessartine and grossular components. The composition is typical for metamorphic almandine from Idaho-type localities (Dickison 2018).

Using a Magilabs GemmoSphere spectrometer, we obtained UV-Vis-NIR spectra (Figure 3) of 12 samples and compared them to typical Idaho almandine from the Emerald Creek and

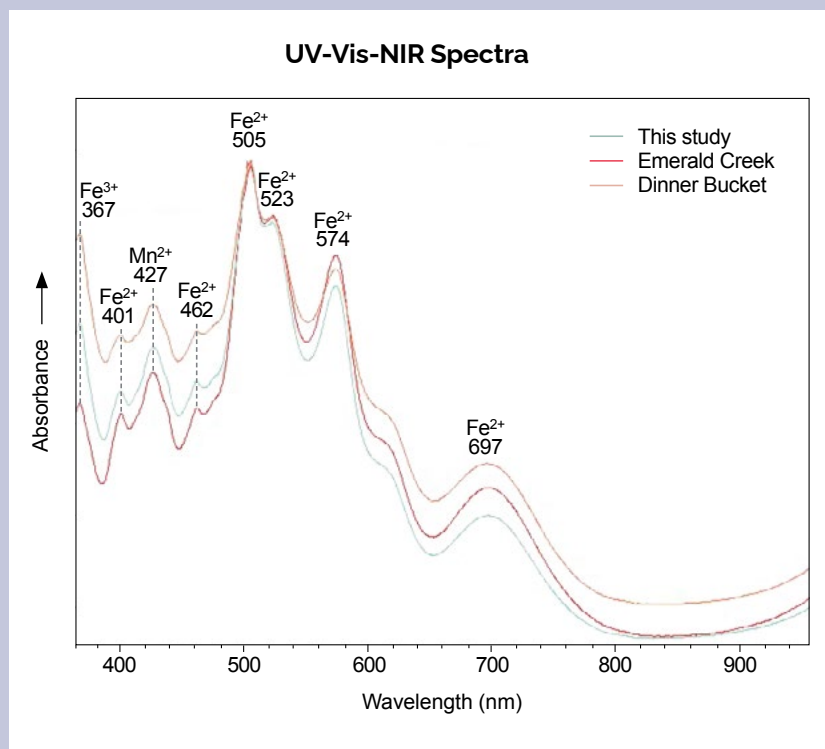


Figure 3: UV-Vis-NIR absorption spectra show very similar patterns for the Idaho material examined for this study as compared to those from the Emerald Creek and Dinner Bucket localities in Idaho (spectra courtesy of Stone Group Laboratories). The spectra mainly show features associated with Fe^{2+} , as expected for the almandine-rich composition of these garnets.

Dinner Bucket localities. All these samples showed similar spectra. The prominent bands at 505, 523 and 574 nm, together with the broader feature near 697 nm, are characteristic of Fe²⁺ in almandine-rich garnet. The absorption at 427 nm is consistent with the presence of Mn²⁺. In conjunction with the measured RI and SG values, the absorption spectra support an almandine-dominant composition for these Idaho garnets within the pyrope-almandine-spessartine series (Geiger *et al.* 2023).

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Charles Evans FGA DGA (charles_evans@stuller.com)
Stuller Gemological Laboratory
Lafayette, Louisiana, USA

Green Grossular from Niger

During the February 2026 gem and mineral shows in Tucson, Arizona, USA, rough stone dealer Farooq Hashmi (Intimate Gems, Glen Cove, New York, USA) showed *Journal* editor-in-chief Brendan Laurs some green garnets from Niger. He reported first seeing this material at the Tucson gem shows in approximately 2016. Around that time, gem cutter Stephen M. Avery (Lakewood, Colorado, USA) obtained a rough parcel and had most of it cut overseas, yielding gems typically weighing $2/3$ – $3/4$ ct. Since this garnet had not been previously characterised, Avery kindly loaned seven of the stones (0.54–0.86 ct; Figure 4) to the Stuller Gemological Laboratory for examination. The garnets displayed a light, moderately saturated yellowish green body colour, a vitreous to sub-adamantine lustre, and clarity ranging from eye-clean to moderately included. Testing with standard

gemmological instruments yielded a singly refractive result, with some samples exhibiting anomalous double refraction. The RI ranged from 1.730 to 1.732, which is lower than typically documented for



Figure 4: Seven faceted green grossular gemstones (0.54–0.86 ct) from Niger were characterised for this report. Photo by Hannah Pepper, Stuller Inc.