Hands-on Gemmology

The Bear Facts

Bear Williams has some crushing news on peridotite and gets some unexpected results from a group of amblygonites

Going green

A recent report informs us that plans are afoot to 'grind up' peridotite.

Peridotite is a major component of the Earth's mantle beneath the crust and lithosphere. Fresh peridotite may be brought through the Earth's crust as a magmatic igneous rock and consists primarily of the mineral olivine, although it may include other mafic minerals such as pyroxene, amphibole and mica. Once at the surface, peridotites weather into members of the serpentine group of minerals, such as chrysotile.

Many of these peridotites contain important gem materials such as peridot, garnet and diamond, which formed at depth within the mantle. It seems peridotite has a "voracious appetite for [eating] carbon dioxide". In the *Economist* magazine (21 November 2008) it states: "Geologists have long known that when peridotite is exposed to the air it can react quickly with carbon dioxide to form carbonates like limestone or marble." Regarding this process, they are looking into the idea of "grinding up the peridotite" to further increase its ability "to soak up emissions" such as carbon dioxide waste from power stations. It is principally the alteration of the olivine in these rocks by water and carbon dioxide that 'fixes' the carbon.

Faceted peridots.

As one of the more attractive varieties of olivine, peridot would like to present itself as your personal representative in the effort to thwart increasing greenhouse gases. Show you're green by wearing your own peridot — no need to crush it up for maximum effect.

Amblygonite

Recently submitted to the Stone Group Lab was a series of attractive, pastel-coloured stones thought to be amblygonites. The stones had good clarity and attractive colours ranging from a pastel lemony yellow to a light greenish blue, much like an unheated aquamarine. Some colours fell in between, neither quite yellow nor green. The sizes ranged from 0.76 to 1.96 ct. RIs varied slightly within the group (1.614-1.640), with notably strong birefringence.

The amblygonites are a lithium-aluminium phosphate group of minerals with variation between hydroxyl and fluorine. Raman comparisons gave a best match to montebrasite, an isomorphous hydroxyl member of the amblygonite series. Amblygonite and montebrasite have been found ranging from colourless, yellow, pinkish, tan, green, blue and lilac. Pale yellow is most common. While montebrasite can grow in rather large, clean crystals, typical colours are yellow to colourless.

Unexpected was the reaction under the Chelsea colour filter of a distinct pale pink in the blue to greenish colours. Chromium is unlikely in these pegmatitic gems, as iron and manganese are the more common transition elements in the amblygonites. When all stones were exposed to intense daylight for 24 hours no colour change was observed, but upon heating, the blue colour component faded, leaving a very pale golden colour. After heating, the pink Chelsea colour filter reaction was no longer observed. It is increasingly known that gamma (cobalt-60) irradiation is being applied to this material and this is the presumed cause of these blue to greenish colours.

With a hardness of 5.5 to 6 and brittle, it would wear a bit like a fire opal; however this material has perfect basal cleavage and should not be bounced about.

The country of origin is uncertain although Brazil is the most likely