DYED NATURAL CORUNDUM AS A RUBY IMITATION

By K. Schmetzer, H. A. Hänni, E. P. Jegge, and F.-J. Schupp

The gemological properties of a new ruby imitation, produced by dyeing natural colorless to pale-colored corundum, are described. Microscopic and spectroscopic examination revealed a number of diagnostic features: fluorescence of the dye-containing fissures but not the surrounding corundum, red deposits on the fracture planes, and the absence of a 694-nm (chromium) doublet in the spectrum.

Various treatments are known for natural ruby and sapphire. These include irradiation, heat treatment, diffusion treatment, synthetic ruby and sapphire overgrowths, and the filling with glass or organic substances (oil, paraffin, resin, epoxy, etc.) of surface-reaching cavities and fissures.* Such treatments have been described extensively in the literature, for example: Gübelin, 1961; Crowningshield, 1979; Nassau, 1981; Koivula, 1983; Scarratt and Harding, 1984; Kane, 1984; Schmetzer, 1986, 1988; Hänni, 1988; and Kammerling et al., 1990.

Most of the corundum treatments reported to date are performed to improve the visual appearance and/or stability of the natural stones. Occasionally, Verneuil flame-fusion synthetic corundum is subject to "quench crackling" (heating then rapid cooling by immersion in a liquid) and subsequent flux treatment to mask its synthetic origin by producing artificial fingerprint-like inclusions (Koivula, 1983; Kane, 1985; Schmetzer, 1986).

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Gems & Gemology, *Vol. 28, No. 2, pp. 112-115.*

Recently, the authors encountered a new corundum treatment, whereby fractures are induced in natural colorless to pale-colored sapphire and then dyed to produce a purplish red imitation of ruby. The red staining of fissures induced in quartz by quench crackling has been used for centuries to imitate ruby (see, e.g., Fryer et al., 1981; Nassau, 1984), but to our knowledge this is the first report of such a treatment being used on corundum.

BACKGROUND

In late 1991 (see International Colored Stone Association [ICA] Alert No. 50, December 1991), four strands of flattened spherical beads (figure 1) were submitted to the SSEF laboratory in Zürich for testing. The beads had reportedly been manufactured in India; the largest were 15 mm in diameter (approximately 10 ct).

Some beads exhibited large areas that were colorless to pale yellow (again, see figure 1). We subsequently determined, using the techniques discussed below, that they had been dyed.

**According to CIBJO rules for treatments of natural corundum, all such treatments of natural stones, with the exception of a simple heat treatment (performed without any addition of chemicals and/or color-causing trace elements), must be disclosed to the consumer. All of the above-mentioned treatments for corundum are identified on official identification reports issued by GIA's Gem Trade Laboratory. In contrast to CIBJO rules, this also includes disclosure of heat treatment of rubies and sapphires.*