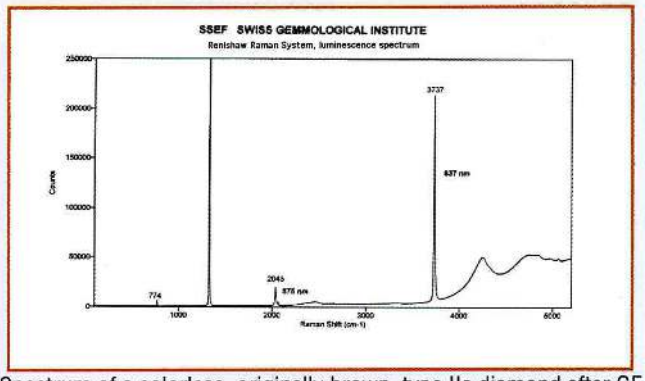
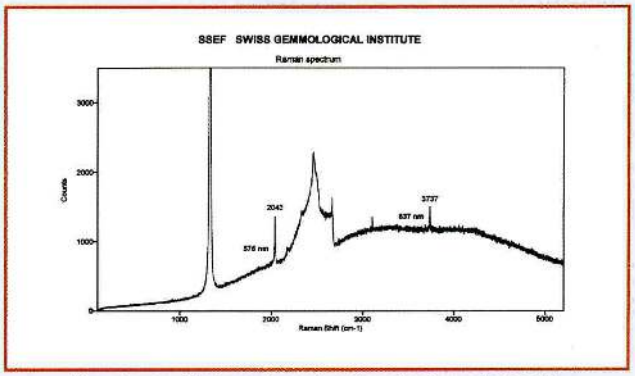
Recognizing GE POL diamonds
at the SSEF Swiss Gemmological Institute

In 1999 Lazare Kaplan International (LKI) and General Electric announced a new process that could irreversibly improve the clarity, brilliance, and brightness of colored diamonds. The process involves treatment of near-colorless diamonds at high pressures and temperatures, resulting in colorless diamonds that are indistinguishable by conventional gemmological techniques from their naturally colorless counterparts. Thus, when Pegasus Overseas Ltd. (a subsidiary of LKI) announced in March 1999 that they would market these treated diamonds, they agreed to inscribe the girdles with the 'GE POL' label to distinguish them and prevent them being sold as natural gem quality diamonds by unscrupulous dealers. By summer that year removal of the inscription on some stones had been detected and the jewelry industry and gemmological institutes worldwide sought other methods by which GE POL treated diamonds could be recognized.

Spectra obtained using a Renishaw System RM1000 Raman microscope have been successful in detecting GE POL treated type IIa originally brown diamonds.



Spectrum of a colorless, originally brown, type IIa diamond after GE POL treatment



Spectrum of a type IIa naturally colorless diamond

The main feature in the Raman spectrum of pure diamond is an intense peak which occurs at 1332 wavenumbers (cm^{-1}). In natural diamonds, this intense Raman peak is accompanied by higher wavenumber fluorescence bands caused by the impurities present.

By cooling type IIa diamonds to liquid nitrogen temperatures, fluorescent bands at 2043 cm^{-1} (575 nm) and 3737 cm^{-1} (637 nm) can be observed, which indicate the presence of N-V centers (a single nitrogen atom linked to a carbon vacancy). Type IIa naturally brown diamonds display intense fluorescence bands, indicating the presence of a large number of N-V centers (giving the diamond its brown coloration). After GE POL treatment these diamonds are colorless. However, they still have intense fluorescence bands, but the relative intensity of the 575 nm and the 637 nm peaks is the reverse of that observed for the untreated diamonds. This reversal has been found to be characteristic of GE POL treatment (D. Fisher, R. A. Spits, *Gems and Gemology*, Spring 2000, 42). Most naturally colorless type IIa diamonds also show the presence of N-V centers, and by examination of the 637 nm/575 nm peak height ratios in their fluorescence spectra, workers at the SSEF have been able to discriminate between naturally colorless type IIa diamonds and type IIa diamonds rendered colorless by the GE POL treatment.

Spectra were recorded on a Renishaw Raman System 1000 microscope using 514.5 nm laser emission and cryogenic sample cooling to liquid nitrogen temperatures.

Data courtesy of H. A. Hänni, SSEF Swiss Gemmological Institute, Basel.

For further information please contact Ken Williams, Renishaw plc, UK (details on the back cover).