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Thesis Title	Effects of Heat Treatment on Physical Properties of Natural Ruby
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Abstract

The main purposes of this research are to study effects of heat treatment on physical properties and find the optimum condition of heat treatment to either enhance or reduce the color to increase value of Myanmar ruby. The ruby samples were respectively heated at the temperature 1200 °C , 1300 °C , 1400 °C , 1500 °C , 1600 °C and 1700 °C in flowing oxygen. They were first analyzed by EDXRF to find amount of trace elements Cr, Ti, V, Fe, etc, before the heating condition could be decided. The crystal structure was followed by Cu K_α powder X–ray diffractometer and the c/a ratio of hexagonal structure calculated before and after each heat treatment by Rietveld method. This ratio is minimum at 1200°C. The relative amount of Cr^{3+} present in the powder sample was monitored by X-band ESR spectrometer and found that Cr^{3+} was highest at 1200°C. Emission spectra excited at 195 nm wavelength showed small peak shifts after heat treatment. The absorption spectra measured by of UV/VIS/NIR spectrometer exhibited two broad bands at 406-425 and 554 nm respectively before heat treatment. Larger peak - shifts toward long wavelength after heat treatment occurred at higher temperatures. The red color absorption band is lower before heat treatments. As a result, it may be concluded that, Myanmar ruby enhancement should be heat treated at 1200°C in oxygen atmosphere to make the ruby more intense red and to reduce the black core at the center.