

Abstract

More than 400 ruby samples and 900 sapphire samples from 30 significant gem fields throughout the world were collected for analysis and investigation prior to construction of database. This database is aimed to be used by gemologists of the Gem Testing Laboratory-Gem and Jewelry Institute of Thailand (Public Organization) for identification of geographic origin. All data including basic gemological properties and analyses of many advanced instruments were taken into account. In general, trace elements analyses gained from this study can be recognized into 2 main groups based on geologic origins of corundum such as basaltic-related deposit and metamorphic deposit. $\text{Cr}_2\text{O}_3/\text{Ga}_2\text{O}_3$ against $\text{Fe}_2\text{O}_3/\text{TiO}_2$ ratios which most of them are the crucial color-causing elements quite clearly show differences as mentioned above. Besides, the other elements and their ratios can also indicate moderately differences of geographic origins. However, some deposits, that have similar geologic setting, e.g. Thailand, Cambodia and Laos, may need ultra-trace elements for differentiation. This aspect would be considered for further investigation. Corundum samples from Tanzania show a wide range of composition which can be divided into 2 subgroups, i.e. low iron and high iron that may be related to types of host rock, particularly marble and amphibolite. Regarding to mineral inclusions, there are a few types that may be used along with chemical composition and UV-VIS-NIR absorption pattern for identification of geographic origin.