



A New Heat Treatment of Opaque Sapphires from Basaltic Deposit in Chanthaburi, Eastern Thailand

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Abstract

Basaltic corundums both ruby and sapphire are very popular in the world market because of their beautiful colors and some specific phenomena. Due to high gem-quality corundum rarely occurred in these basaltic-type deposits, heat treatments have been applied for centuries and continuously developed until the present days. Color and clarity can be modified based on natural properties of each stone, particularly micro inclusions and trace elements in the stones. Combination and reaction between Mg, Fe and Ti structure of the stone were proven as the main cause of color changing between blue, yellow and colorless after high temperature heating of sapphire (Fig. 1); moreover, heat treatment with additive Be substances has been introduced into the Mg-Fe-Ti reaction for yellow and brown modification. Recently, the Be-assisting heat treatment has also been developed to lighten dark blue shade and to improve transparency, particularly for basaltic sapphires as well as those from Chanthaburi deposit in Eastern Thailand. The present study is carrying out to understand the process of such techniques. Sub-micrometer inclusions, significantly characterized by Fe-Ti silks causing low transparency and dark brown appearances, appear to be the most crucial factor which an important role of Be may dissolve these inclusion and consequently yield higher transparency and yellow and blue of the treated stone (Fig. 2).

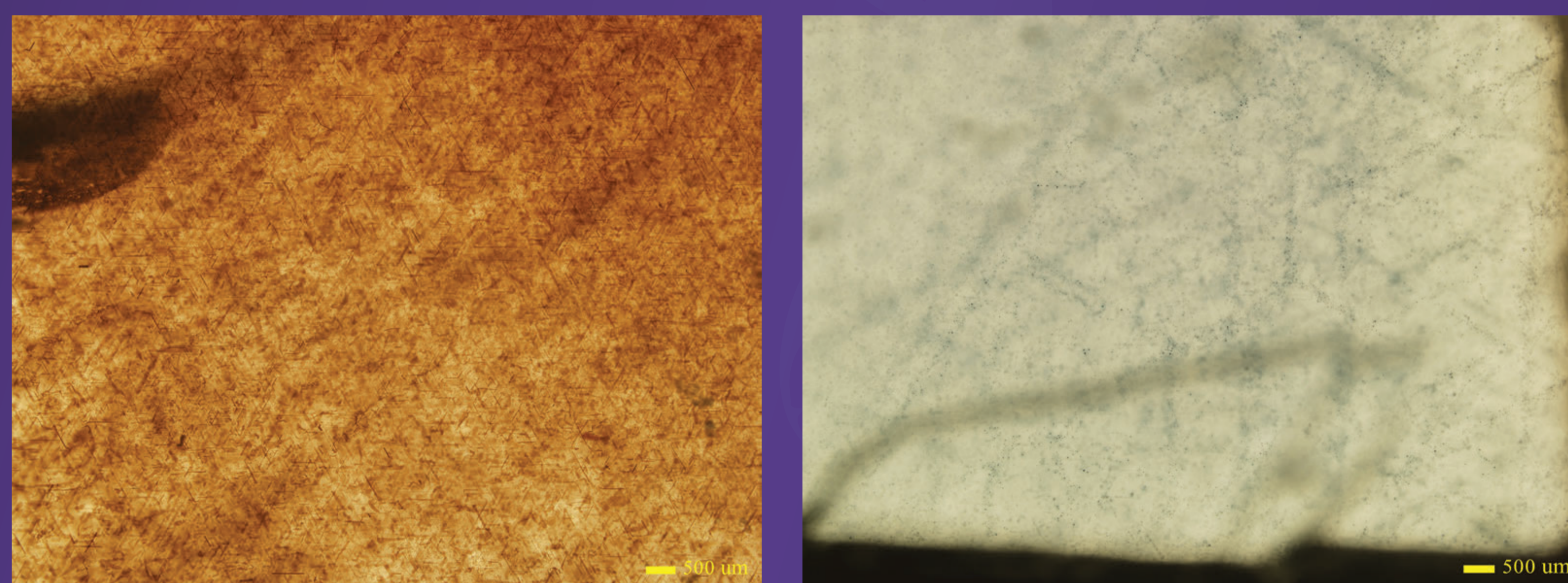


Figure 1. Micro inclusion of Fe-Ti silks in unheated sample (left) and after heat-treated at 1650°C with ambient air



Figure 2. The opaque stones from basaltic deposits in Chanthaburi, Thailand (left) Influence of Be may dissolve the Fe-Ti silks and consequently yield higher transparency and yellow and blue color of the treated stone (right)

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