The Mogok area in Myanmar (Burma) is known since historic times as a source for some of the finest rubies and spinels in the world. In this study, we focus on in-situ U-Pb geochronological analyses of zircon and zirconolite, either present as inclusions in gem-quality ruby and spinel or as accessory minerals in ruby- and spinel-bearing marble and adjacent granulite facies gneisses. The age determination was carried out using both laser ablation inductively coupled plasma time-of-flight mass spectrometry (LA-ICP-TOF-MS) and sector-field mass spectrometry (LA-ICP-SF-MS). In addition, we present multi-element data (REE) of zircon and zirconolite collected with LA-ICP-TOF-MS to further characterize these inclusions. Most of the studied zircon grains display growth zoning (core/rim) regardless if as inclusion in gemstones, or as accessory mineral in host rock samples. U-Pb dating was conducted on both core and rim of zircon grains and revealed most ages ranging from 200 Ma in the core to 17 Ma in the rim. The youngest U-Pb ages determined from the rim of zircon inclusions in gem-quality ruby and spinel are 22.26 ± 0.36 Ma and 22.88 ± 0.72 Ma, respectively. This agreement in U-Pb ages is interpreted to indicate a simultaneous formation of ruby and spinel in the Mogok area. In ruby- and spinel-bearing marble from Bawlongyi, the youngest zircon age was determined as 17.11 ± 0.22 Ma. Furthermore, U-Pb age measured on the rim of zircon grains in a biotite-garnet gneiss reveals a Late Oligocene age (26.13 ± 1.24 Ma), however older ages up to Precambrian age were also recorded in the cores of zircon as accessory minerals from this gneiss. These old ages point to a detrital origin of the analysed zircon cores. Although non-matrix matched standard was applied, zirconolite U-Pb age results are narrower in distribution from 35 Ma to 17 Ma, falling within the range of zircon ages. Based on results which are well in accordance with previous geochronological data from the Mogok Metamorphic Belt (MMB), we deduce that gem-quality ruby and spinel from Mogok probably formed during a granulite-facies regional metamorphic event in Oligocene to Early Miocene, related to post collision tectonics of the Eurasian and Indian plates. Our data not only provide key information to understand the formation of gem-quality ruby and spinel in the so-called Mogok Stone Tract, but also provide assisting evidence when determining the country of origin of gemstones in gemmological laboratories.

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