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# Scanning Electron Microscopy of Quartz in Precambrian Cherts and Dolomites from Southern Africa

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**Abstract:** Scanning electron microscopic (SEM) examination of the quartz isolated from chert of Transvaal and Swaziland, of 2000 and 3400 million year (MY) ages, respectively, in southern Africa revealed marked differences in quartz morphology. Well-defined individual euhedral quartz crystals, with polyhedral triple-point faces, were clearly evident on freshly fractured Transvaal chert surfaces as well as with the quartz isolates from the chert. The morphology and coarseness suggest crystal growth with little, if any, metamorphism; however, the  $\delta^{18}\text{O}$  values of 23.8– 24.1‰ suggest crystallization temperatures of perhaps 40– 45° C. In contrast, fracture surfaces of the older, strongly metamorphosed Swaziland cherts revealed a high degree of grain intergrowth which inhibited fracture between quartz grains. Quartz isolates from these showed strongly interlocked quartz crystal clusters and elongated chips of quartz with poorly defined irregular faces. Intercalation of mineral veins in the cherts on a mm scale and the intergrown character of the quartz grain boundaries provide evidence that the latter cherts have been strongly metamorphosed and recrystallized, in keeping with 14.6– 15.1‰  $\delta^{18}\text{O}$  values, corresponding to 80° C fractionation with water. The SEM micrographs of the fine quartz (1– 10  $\mu\text{m}$ ) isolated from the Otavi dolomite formation of the 700-MY Damara System and from the 2000-MY Transvaal Dolomite Series revealed well-defined subhedral and euhedral quartz crystals of small size which, together with the 26.9– 27.8‰ and 23.8‰  $\delta^{18}\text{O}$  values, respectively, indicate that these dolomites have been affected little, if any, by post-depositional metamorphism; their crystallization temperatures fall in the range of 25– 30 and 40– 45° C, respectively.

**Key Words:** Chert • Crystallization • Dolomite • Morphology • Metamorphism • Quartz

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