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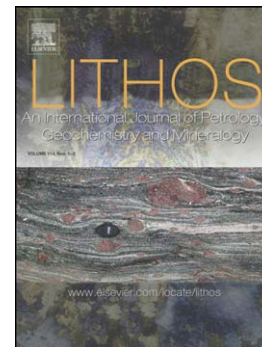
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Moissanite (SiC) with metal-silicide and silicon inclusions from tuff of Israel: Raman spectroscopy and electron microscope studies

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ABSTRACT

Here, we present studies of natural SiC that occurs *in situ* in tuff related to the Miocene alkaline basalt formation deposited in northern part of Israel. Raman spectroscopy, SEM and FIB-assisted TEM studies revealed that SiC is primarily hexagonal polytypes 4H-SiC and 6H-SiC, and that the 4H-SiC polytype is the predominant phase. Both SiC polytypes contain crystalline inclusions of silicon (Si⁰) and inclusions of metal-silicide with varying compositions (e.g. Si₅₈V₂₅Ti₁₂Cr₃Fe₂, Si₄₁Fe₂₄Ti₂₀Ni₇V₅Zr₃, and Si₄₃Fe₄₀Ni₁₇). The silicides crystal structure parameters match Si₂TiV₅ (*Pm-3m* space group, cubic), FeSi₂Ti (*Pbam* space group, orthorhombic), and FeSi₂ (*Cmca* space group, orthorhombic) respectively. We hypothesize that SiC was formed in a local ultra-reduced environment at respectively shallow depths (60-100 km), through a “desilification” reaction of SiO₂ with highly reducing fluids (H₂O-CH₄-H₂-C₂H₆) arisen from the mantle “hot spot” and passing through alkaline basalt magma reservoir. SiO₂ (melt) interacting with the fluids may originate from the walls of the crustal rocks surrounding

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