# Deep carbon: SiC in mantle- and mantle-generated rocks

JIN-XIANG HUANG[1], W. L. GRIFFIN[1], L.MARTIN[1,2], V.TOLEDO[3], S. Y. O'REILLY[1]

[1]CCFS/GEMOC, Macquarie University, Sydney, Australia
[2]CCMCA, University of Western Australia, Perth, Australia
[3]Shefa Yamim (A.T.M.) Ltd., Israel

Melts and fluids are magic active components of the solid Earth, which keep the Earth dynamic and evolving. However, our knowledge of such components is deficient, especially under mantle conditions.

Moissanite (SiC) has been found in different mantle and mantle-generated rocks from different tectonic settings, and its formation may be closely related to the mantle melts/fluids. We have investigated SiC from kimberlites, mantle xenoliths, Tibetan ophiolites, and ejecta from volcanoes in Israel.

SiC grains may contain inclusions of native Si, silicides of Fe, V and Ti, and corundum, consistent with high-T crystallization. Different grains in the same sample can have different polytypes, mainly 6H, with minor 4H and 15R. SIMS analyses show a large variation in both $\delta^{30}$Si (-1.20 to +1.58 ‰) and $\delta^{13}$C (-24 to -32‰) among different samples. Individual grains usually are homogeneous in terms of $\delta^{30}$Si, but different grains even in the same mantle sample can differ by up to 1.5‰. Such variation is not related to differences in polytypes. However, each sample has generally homogeneous C isotopic compositions. The observed isotopic heterogeneity may be related either to the passage of different melts/fluids through a given mantle volume, or to unidentified fractionation processes. The broad C-Si isotopic similarities of SiC from different tectonic settings, and the isotopic differences between SiC and "mantle values" for both $\delta^{30}$Si and $\delta^{13}$C suggest the operation of broadly similar processes, capable of producing extremely reducing conditions on at least local scales in the mantle.