

**TEXTURAL EVOLUTION OF VOLCANIC ROCKS: INVESTIGATING MAGMA RHEOLOGY, PETROLOGY, AND  
ERUPTIVE PROCESSES**

**Gabbroic Shergottite Northwest Africa 6963: An intrusive sample of Mars‡**

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**ABSTRACT**

Meteorite Northwest Africa (NWA) 6963 was classified as a basaltic shergottite based on mineralogy, but here we show that it is a gabbroic rock with a quartz-alkali feldspar intergrowth that represents a late-stage granitic melt. NWA 6963 contains clinopyroxene and maskelynite grains up to 5 mm in length, with minor ferroan olivine, spinel, ilmenite, merrillite, apatite, Fe-sulfides, and high-Si glass. NWA 6963 also contains areas of quartz and alkali-feldspar intergrowths up to ~1 mm in size. Based on mineral abundances and textural analysis, we suggest that NWA 6963 is an intrusive rock similar to a terrestrial gabbro. Infiltration of the martian crust by young gabbroic bodies would suggest that estimates of crustal composition, density, and thickness based on the surface chemistry alone would be problematic and the martian crust may be even more heterogeneous than is seen from orbit alone. Investigations of crater walls, where intrusive crustal rocks would be exposed, are needed to discover the launch sites of the shergottites and the full heterogeneity of the martian crust.

**Keywords:** Mars, gabbro, SNC meteorite, shergottite, intrusive, micro-graphic, granite