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HIGHLIGHTS AND BREAKTHROUGHS

Spinel in planetary systems

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Abstract: Spinel is ubiquitous as a rock-forming mineral in terrestrial, lunar, and planetary basalts and closely associated meteoritic equivalents. A major unknown is whether these rocks formed under similar conditions of partial melting of primary or modified mantle, whether redox environments played a role in evolutionary trends, and did mineral crystal chemistry have any influence on elemental partition between solids and liquids? In a novel approach by Papike et al. (2015), spinel is used as an informative, albeit complex indicator of oxygen fugacity, site occupancy of multiple valence elements, and spinel structural types. Planetary basalts may be reduced (IW-3), oxidized (Earth at FMQ), or of intermediate redox state (Mars). Taking an expansive view, the spinel approach holds enormous promise in understanding the magmatic differentiation of asteroids. **Keywords:** Spinel, inverse spinel, planetary systems, asteroids