# 金星上花崗岩質液體模擬之實驗岩石學

# Formation of Granitic liquids on Venus

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ABSTRACT

The presence of highly evolved igneous rocks on Venus is debated. The formation of highland terranes and pancake domes are the two principle tectonic and volcanic features which argue in favor of the presence of silicic igneous rocks; however, the lack of water on Venus casts doubt on whether or not granites and rhyolites can form. Data returned to Earth from the Venera 13 and 14 landers show that the surface of Venus is comprised of basaltic rocks similar in composition to those found on Earth. Computational modeling has shown that anhydrous and hydrous fractional crystallization modeling using the Venera 13 and 14 data as starting materials can produce compositions similar to terrestrial phonolites and rhyolites. It is suggested that at shallow crustal levels (i.e. $\leq 0.1$ GPa) mafic magmas can differentiate into silicic magmas resembling phonolites or rhyolites which may or may not erupt. Furthermore, the hydrous equilibrium partial melting models can produce rocks similar to terrestrial andesites and rhyolites whereas anhydrous models suggest there may be a uniquely Venusian type of silicic rock. It is proposed that petrological experiments using synthetic compositions equal to the data returned to Earth from the Venera probes are undertaken to determine if silicic liquids can be generated from rocks were are typical of the Venusian surface. The formation of silicic rocks could

have substantial implications for the planetary evolution of Venus and the formation of the highland terranes which comprised ~10% of the surface.

Keywords: Venus, granites, petrological modeling, planetary evolution

**Project Schedule:**
2 weeks for paper reading and sample preparation; 2 weeks to create synthetic Venusian basalt; 2 weeks to analyze samples; 2 week: synthetic interpretation and complete the presentation / report.

**Preferred background:**
Students should have working knowledge of rock identification, laboratory experience and sample processing.

Learn XRF, SED/EDS and EPMA analytical techniques.