NWA 5029 BASALTIC SHERGOTTITE: A CLONE OF NWA 480/1460? T. Mikouchi[1] and J. A. Barrat[2]. [1]Dept. of Earth and Planet. Sci., University of Tokyo, Hongo, Tokyo 113-0033, Japan. E-mail: mikouchi@eps.s.u-tokyo.ac.jp. [2]CNRS UMR 6538, UBO-IUEM, Place Nicolas Copernic, 29280 Plouzané Cedex, France.

Introduction: NWA 5029 is a 14.67 g individual stone with 60% fusion crust found in Morocco in 2003. It is mainly composed of 78% pyroxenes and 18% plagioclase (maskelynite), thus can be classified as a basaltic shergottite. Here we report its mineralogy and petrology, and discuss its crystallization history in comparison with NWA 480/1460.

Petrology and Mineralogy: NWA 5029 pyroxenes show an elongated euhedral to subhedral texture reaching up to 5 mm long with the width of ~0.5 mm. They have large Mg-rich low-Ca pyroxene cores ($Mg_{78}Fe_{19}Ca_3$) partly mantled by thin ragged augite rims ($Mg_{46}Fe_{22}Ca_{32}$). Some pyroxene grains (albeit rare) further extend to Fe-rich pigeonite edges ($Mg_{13}Fe_{72}Ca_{14}$). Plagioclases are completely transformed to maskelynite, showing an interstitial lath texture (1 x 0.3 mm) to pyroxenes. They are usually present as clusters of several grains parallel to each other. Maskelynite is weakly zoned ($An_{55-45}Ab_{43-51}Or_{2-4}$). Si, Al-rich glass is occasionally associated with maskelynite. Minor phases are Ca phosphates (merrillite and apatite), silica, ilmenite, chromite, and Fe sulfide. They are typically present in the mesostasis areas. Shock metamorphism is extensive as suggested by the presence of maskelynite and undulatory extinction of pyroxene.

Relationship to NWA 480/1460: NWA 5029 is most similar to NWA 480/1460 in both texture and mineralogy [1,2]. However, there are clear differences between them. The maskelynite abundance of NWA 5029 (18 vol%) is lower than that of NWA 480 (25 vol%), and its shape is thinner. Furthermore, NWA 5029 has larger Mg-rich low-Ca pyroxene cores than NWA 480/1460. The mineral compositions of NWA 5029 are close to those of NWA 480/1460, but the most Fe-rich pigeonite in NWA 5029 has an atomic Fe/(Fe+Mg) ratio (Fe#) of up to 0.9, which is lower than that of NWA 480/1460 (Fe#~1). Therefore, NWA 5029 is probably not paired with NWA 480/1460 although it is likely that they originated from the same igneous body on Mars (geochemical work is required to conclude this).

Crystallization history: A unique pyroxene zoning of NWA 5029 is similar to QUE 94201 and NWA 480 [1,3], suggesting its crystallization from a melt by a single-stage cooling episode (cooling rate: 0.5-1 ^{o}C/hr) [1,3]. However, NWA 5029 may be a pyroxene cumulate because of its large size of pyroxene cores and small abundance of maskelynite. The MELTS calculation shows that low-Ca pyroxene ($Mg_{78}Fe_{19}Ca_3$) crystallizes from the bulk composition of NWA 480 [1], which matches the pyroxene core compositions of both NWA 5029 and NWA 480. This result suggests that they have experienced slightly different crystallization stages although they crystallized from the same parent melt. NWA 480 rapidly crystallized from the beginning to its final solidification [1]. In contrast, NWA 5029 cooled slowly at first and Mg-rich pyroxenes were accumulated (now represented by large pyroxene cores), and then rapidly crystallized to form unique chemical zoning of pyroxene similar to NWA 480.

References: [1] Barrat J. A. et al. 2002. *Meteoritics & Planetary Sci.* 37:487-500. [2] Irving A. J. and Kuehner S. M. 2003. Abstract #1503. 34th Lunar & Planetary Sci. Conf. [3] Mikouchi T. et al. 1998. *Meteoritics & Planetary Sci.* 33:181-189.