NORTHWEST AFRICA 1670: A NEW QUENCHED ANGRITE. T. Mikouchi[1], G. McKay[2], E. Koizumi[1], A. Monkawa[1], M. Miyamoto[1], [1]Dept. of Earth & Planet. Science, University of Tokyo, Tokyo, Japan, [2]Mail Code SR, NASA Johnson Space Center, Houston, TX 77058, USA (E-mail: mikouchi@eps.s.u-tokyo.ac.jp).

NWA1670 is a new angrite recently discovered from occidental Sahara (total mass: 30.6 g). NWA1670 shows a porphyritic texture composed of olivine megacrysts set in a very fine-grained lathy groundmass. The size of olivine megacrysts reaches 3 mm across. Euhedral (sometimes skeletal) olivines of smaller size (~1 mm) are also present and are often overgrown at the megacryst rims. The groundmass is composed of intergrown lath grains of anorthite, Al- and Ti-rich clinopyroxene (fassaite), and calcic olivine. Accessory minerals include hercynite spinel, chromite, and Fe sulfide. The lath grains in the groundmass are up to 1 mm long with the width of a few tens of µm. Calcic olivine is present as patches in the fassaite laths. The modal abundances of minerals are 45% olivine, 24% fassaite, 23% anorthite, 7% calcic olivine, and 1% others. Unlike other angrites, NWA1670 shows evidence for strong shock metamorphism. Minor impact melt vein is present and olivine megacrysts display mosaicism or undulose extinction.

The olivine megacrysts have homogeneous cores except for the overgrown rims although some megacrysts are systematically zoned from core to rim. There is a variation in the core composition from one grain to another. The most magnesian olivine core is Fo_{96}. The olivine megacrysts contain 0.05-0.5 wt% Cr_2O_3 and 0.05-0.7 wt% CaO, respectively. Tiny spherules (~5 µm) of Fe metal and sulfide are present in some olivine grains. Euhedral olivine grains are zoned (Fo_{85-65}) with ~1 wt% CaO at the rims. Plagioclase is essentially Na- and K-free and is nearly pure anorthite. Both FeO and MgO contents are 1~5 wt% and 0.1-2 wt%, respectively. Fassaite is also extensively zoned (*fe#*: 0.49-0.89). The Al_2O_3 content is generally 6-8 wt%, but some analyses reach ~16 wt%. The TiO_2 content is 1.5-3 wt% and the Cr_2O_3 content is 0.5-0.0 wt%. The groundmass olivine is Fe- and Ca-rich (*fe#*: 0.58-0.87, CaO: 2-12 wt%).

It is obvious from mineralogy and petrology that NWA1670 is a new angrite. The Fe/Mn ratio of olivine and pyroxene is in agreement with those of other angrites. The porphyritic texture of NWA1670 is generally similar to "quenched" angrites with olivine xenocrysts [e.g., 1-3]. Fassaite and olivine compositions of the groundmass are close to those of Sahara99555, which we believe to represent an angrite magma composition [4]. It is likely that NWA1670 is co-magmatic with other quenched angrites. Because of the extremely magnesian composition of the olivine megacrysts in contrast to the groundmass minerals, it is probable that megacrysts in NWA1670 are xenocrysts. The lath texture of the groundmass shows rapid cooling from the melt. The euhedral olivine and overgrown grains on the megacrysts are probably phenocrysts that crystallized from the same melt prior to the groundmass crystallization. The cooling rate of NWA1670 would be comparable to or faster than those of other quenched angrites (LEW87051, Asuka881371, and D'Orbigny: ~10 ^{o}C/hr [2]). The origins of the megacrysts are unclear. The Fo_{96} olivine in NWA1670 is the most magnesian olivine among all the known angrites. Since it is hard to produce such Mg-rich olivine by normal igneous differentiation processes, we need to consider a new story for the angrite petrogenesis.

References: [1] Mikouchi T. et al. (1996) *Proc. NIPR Symp. on Antarct. Meteorites*, *9*, 174-188. [2] Mikouchi T. et al. (2001) *Meteorit. Planet. Sci.*, *36*, Suppl. A134-135. [3] Mittlefehldt D. W. et al. (2002) *Meteorit. Planet. Sci.*, *37*, 345-369. [4] Mikouchi T. and McKay G. (2003) *Meteorit. Planet. Sci.*, *38*, Suppl. (this volume).