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Separating $\leq 20 \mu\text{m}$ sized mineral fractions for geochronology of lunar sample 67935.

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Apollo 16 sample 67935 belongs to the so-called “mafic melt breccias,” which likely formed during the Imbrium event [1]. An old Re-Os date ($4.21 \pm 0.13 \text{ Ga}$ [2]), however, is inconsistent with an Imbrium origin ($3.91\text{-}3.94 \text{ Ga}$ [3]). To resolve this contradiction, we are trying to date 67935 using other isotopic systems (Lu-Hf, Sm-Nd, Rb-Sr, and U-Pb). Our first attempt at separating minerals for internal isochrons was unsuccessful because the working grain size ($63\text{-}125 \mu\text{m}$) was coarser than the prevailing mineral grains ($\sim 20 \mu\text{m}$). To solve this problem, we developed an enclosed system for magnetic separation in ethanol (based on [4]). This setup allows successful mineral separation from a $\leq 20\text{-}\mu\text{m}$ fraction. The resulting ranges in parent-daughter ratios should be sufficient for isochron determination ($^{87}\text{Rb}/^{87}\text{Sr} = 0.024\text{-}0.081$, $^{176}\text{Lu}/^{177}\text{Hf} = 0.017\text{-}0.022$), but both of these systems have apparently been disturbed by a later event.

[1] Haskin, L. A. et al. (1998) MAPS 33, 959–975. [2] Fischer-Gödde, M. & Becker, H. (2012) GCA 77, 135–156. [3] Bottke, W. F. & Norman, M. D. (2017) Annu. Rev. Earth Planet. Sci. 45, 619–647. [4] Lumpkin, G. R. & Zaikowski, A. (1980) Am Min 65, 390–392.

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