U-Pb Dating of Baddeleyite in Shergotty, Zagami and NWA 2737: Implications for Crystallization and Impact Ages of Martian Meteorites. S. Ozawa1, T. R. Ireland2, A. El Goresy3 and E. Ohtani1. 1Department of Earth and Planetary Materials Science, Graduate School of Science, Tohoku University, Sendai 980-8578, Japan. E-mail: shin-ozawa@m.tains.tohoku.ac.jp. 2Research School of Earth Sciences, Australian National University, Canberra ACT 0200, Australia. 3Bayerisches Geoinstitut, Universität Bayreuth, 95440 Bayreuth, Germany.

Introduction: It is widely accepted that SNC (Shergottite-Nakhlite-Chassignite) meteorites were derived from Mars. However, there is still a debate on the crystallization ages of shergottites and chassignites. Recently, Bouvier et al. (2005, 2008) reported old Pb-Pb ages (~4.1 Ga) for basaltic shergottites, as well as young Rb-Sr, Sm-Nd and Lu-Hf ages (150-180 Ma) for the same meteorites. Also, Misawa et al. (2005) reported a Sm-Nd age for whole rock of NWA 2737 chassignite as ~1.4 Ga, while Bogard et al. (2008) reported an Ar-Ar age of 160-190 Ma for the same meteorite. In order to clarify the real crystallization and impact ages of shergottites (Shergotty, Zagami) and a chassignite (NWA 2737), we conducted U-Pb dating of baddeleyite (ZrO2) in these meteorites.

Analytical Procedure: We searched for baddeleyite in these meteorites carefully using a FE-SEM and observed their fine textures. Baddeleyite grains larger than 4 microns were chosen for U-Pb analyses. We collected Raman spectra of them using a micro-Raman spectrometer and analyzed chemical compositions using an EPMA. After the Au coating of samples, we conducted U-Pb isotopic measurements of the selected baddeleyite grains using a SHRIMP II at Australian National University.

Results: We found relatively large (4-15 µm) baddeleyite grains in these meteorites; 7 grains from Shergotty, 2 grains from Zagami and 1 grain from NWA 2737. These baddeleyites usually occur with ilmenite, titanomagnetite and pyrrhotite. Among the seven baddeleyite in Shergotty, two grains are located near shock-melted materials. Also, one baddeleyite in Zagami shows texture strongly suggesting shock-induced melting and thus resetting of its age. In this meeting, we will show U-Pb data and ages of the baddeleyites in Shergotty, Zagami and NWA 2737, explain the high importance of sifting unshocked from shock-melted baddeleyites prior to any isotopic studies and discuss the relation between the occurrence of each grain and their ages. We will present detailed textural parameters allowing the identification of pristine from shock-melted baddeleyites without which in situ isotopic study could only lead to discrepant results. This procedure helps to avoid pitfalls in analyzing baddeleyites without scrutinizing their mode of formation.