

PROPOSAL FOR EXPERIMENT AT RCNP

4 August, 2017

TITLE:

Non-destructive elemental analysis of carbonaceous, ordinary and enstatite chondrites using DC Muon beam: Application to chemical classification of extraterrestrial materials

SPOKESPERSON:

Name: Dr. Kentaro Terada
Affiliation: Graduate school of Science, Osaka University
Position: Professor
Address: 1-1 Machikaneyama, Toyonaka, Osaka 560-0043, JAPAN
Phone: +81-6-6850-5495
FAX: +81-6-6850-5480
E-mail: terada@ess.sci.osaka-u.ac.jp

EXPERIMENTAL GROUP:

Name	Institution	Position
K. Terada	Department of Earth and Space Science, Osaka Univ.	(P)
Y. Kawai	Department of Earth and Space Science, Osaka Univ.	(RA)
S. Tachibana	Department of Natural History Sciences, Hokkaido Univ.	(AP)
T. Osawa	Material Sciences Research Center, JAEA	(Principal Researcher)
K. Ninomiya	Department of chemistry, Osaka Univ.	(RA)
A. Sato	Department of Physics, Osaka Univ.	(RA)
T. Takahashi	JAXA	(P)
Y. Miyake	J-PARC	(P)
D. Tomono	RCNP, Osaka Univ.	(RA)
K. Righter	NASA, Johnson Space Center	(PhD)

RUNNING TIME: total 3 days

BEAM LINE: WSS

BEAM REQUIREMENTS:

Type of particle: proton
Proton Beam energy: 392 MeV
Proton Beam intensity: 1.1 μ A
Muon intensity: 3×10^4 counts/s for 50-60MeV/c

BUDGET: Nothing

TITLE:

Non-destructive elemental analysis of carbonaceous, ordinary and enstatite chondrites using DC Muon beam: Application to chemical classification of extraterrestrial materials

SPOKESPERSON: K. Terada

SUMMARY OF THE PROPOSAL

Muonic X-ray analysis has great advantages in several ways; (1) non-destructive elemental analysis from light to heavy elements, (2) depth profile analysis, (3) isotopic measurement for heavy elements and (4) investigation of chemical condition (redox-state). Following our successful detection of Muonic X-ray spectra from a CM2 chondrite with MuSIC for the first time (E411, in November 2015), we propose to obtain the fundamental data for quantitative analysis of carbonaceous, ordinary and enstatite chondrites, of which chemical composition and redox-states are unique. This research plan could be a feasibility test whether this non-destructive analysis can be applied to characterize precious extraterrestrial samples returned by space-crafts such as Hayabusa2 and OSIRIS-REx in 2020's.