PROPOSAL FOR EXPERIMENT AT RCNP

4 August 2017

TITLE:

Development of a new analytical method by muonic X-ray measurement; identification of chemical formula without contact.

SPOKESPERSON:

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EXPERIMENTAL GROUP:

Full Name	Institution	Title or Position
Kazuhiko Ninomiya	Osaka University	Assistant Professor
Atsushi Shinohara	Osaka University	Professor
Makoto Inagaki	Osaka University	Graduate Student
Akihiro Nanbu	Osaka University	Graduate Student
Takuto Kudo	Osaka University	Graduate Student
Akira Sato	Osaka University	Assistant Professor
Kentaro Terada	Osaka University	Professor
Kenya Kubo	International Christian University	Professor

RUNNING TIME: Test running time for experiment 0.5 days

Data runs 2.5 days

BEAM LINE: Ring : WSS

BEAM REQUIREMENTS:

Type of particle	proton
Beam energy	392 MeV
Beam intensity _	1.1 μA

BUDGET: Experimental expenses 0 yen

SAFETY CONTROLLED ITEMS:

- beryllium, equipped in HPGe detectors as a vacuum window

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SUMMARY OF THE PROPOSAL

Our group has been developing a new elemental analysis method using negative muon. This method has good features; identify elemental composition inside bulk material without contact. In this work, we aim to add new properties of specifying chemical state in elemental analysis by muon. Absolute muonic X-ray emission rates (muonic X-ray structure) are slightly influenced by the chemical environment of the muon capturing atom, so fundamental data of muonic X-ray structure enable us identification of chemical state. By demonstrating the chemical state analysis, it is possible to spread a new science fields by investigating the internal chemical state of a sealed sample which could not be investigated so far. In this study, we will focus on iron compounds. Muonic X-ray emitted after muon atom formation will be measured by HPGe detectors, and we investigate the difference in formation process of muon atom by the chemical state of iron atom and determine the initial quantum level of captured muon.