PROPOSAL FOR EXPERIMENT AT RCNP

21 December 2020

TITLE:

Application of muonic X-ray analysis on the organic components: the preliminary studies for non-destructive analysis of medical inheritances

SPOKESPERSON:

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Institution	The Museum of Osaka University, Osaka University
Title or Position	Specially Appointed Assistant Professor
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EXPERIMENTAL GROUP:

Full Name	Institution	Title or Position
Kayoko Takaura	The Museum of Osaka University	Assistant Professor
Kazuhiko Ninomiya	Graduate School of Science, Osaka University	Assistant Professor
Akira Sato	Graduate School of Science, Osaka University	Assistant Professor
Kyoko Takahashi	The Museum of Osaka University	Guest Professor
Yuichi Endo	Faculty of Pharmacy, Kindai University	Professor
Dai Tomono	RCNP, Osaka University	Assistant Professor
Yoshitaka Kawashima	RCNP, Osaka University	Researcher

RUNNING TIME:

Installation time (without beam)	1.0 day
Development of device	1.0 day
Test running time for experiment	0.5 days
Data runs	2.5 days
In total (with beam)	**4.0 days**

BEAM LINE: Ring : WSS-MuSIC

BEAM REQUIREMENTS:

Type of particle	proton
Beam energy	392 MeV
Beam intensity	1.1 μA
Other requirements	

BUDGET:

Experimental expenses	0 yen

SAFETY CONTROLLED ITEMS:

no items

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SUMMARY OF THE PROPOSAL

OGATA Koan (1810-1863) was not only the director of Tekijuku, which is one of the origins of Osaka University, but also a physician. He contributed to the development of Western medicine in Japan, but he also knew well about Kampo, the Japanese traditional medication. Osaka University preserves his medicine chests, but some of the medicine bottles contained in the chest are sealed tightly and it is difficult to analyze the medication inside of them. Destructive analysis is not allowed such precious historical samples, then we focused on muonic X-ray analysis. We expected that it enables the non-destructive analysis of the internal medications through the glass bottles. We have already tried this analysis at J-PARC MLF. We selected the bottle whose content was estimated to be Hg_2Cl_2.We succeeded to reveal that content consisted of Hg and Cl.
However, most of the content of Koan's medicine bottles are guessed to consist of organic compounds. In order to identify those medications, we intended to apply the muonic X-ray analysis on organic compounds. It would be difficult to identify organic compounds only by muonic X-ray, then we integrate the pharmacognostic approaches; analysis on literature to point out the candidate compounds. We just aim to construct the methodology to analyze organic compounds in this project in order to make it one of the evidence for the future analysis proposal of Koan's real organic medicinal samp