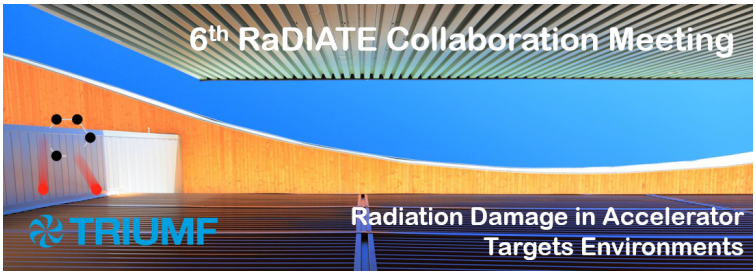

Contribution ID: **22** Type: **Oral presentation**

PRESENT STATUS OF DEVELOPMENT FOR TUNGSTEN ALLOY, TFGR W-1.1%TiC, AS ADVANCED TARGET MATERIAL

Wednesday, 11 December 2019 09:25 (25 minutes)

J-PARC (Japan Proton Accelerator Research Complex) consists of a series of world-class proton accelerators and the experimental facilities that make use of the high-intensity proton beams. Recently, higher intense proton beams are requested due to requirement of further physics research. However, the upgrade of the intensity is dominated by the target technologies.
Tungsten (W) is a principal candidate as proton-accelerator target material because of its high density (19.3 g/cm3) and extremely high melting point (3420°C). Actually, a W target is considered to be used in the upcoming projects such as COMET Phase 2 and MLF 2nd Target Station at J-PARC, Mu2e at Fermilab, SNS 2nd Target Station at ORNL, and neutron target at ESS. However, W is known to exhibit significant embrittlement by recrystallization (recrystallization embrittlement) and by irradiation (irradiation embrittlement). Extensive efforts have been made to develop embrittlement tolerant W materials and TFGR (Toughened, Fine Grained, Recrystallized) W-1.1%TiC has been considered as a realized solution to the embrittlement problems. TFGR W-1.1%TiC exhibits grain boundary reinforced nanostructures containing a high density of effective sinks for irradiation-induced point defects, a DBTT (Ductile-to-Brittle Transition Temperature) down to around RT and enhanced resistances against surface damages by thermal shock/fatigue in the recrystallized state. We initiated to fabricate TFGR W-1.1%TiC and/or more improved W materials with sufficient dimensions for the target applications and investigate their feasibility as the target materials in 2016. While applying for budget acquisition to embody and integrate the W alloy fabrication processes, we are in the stage of producing TFGR W-1.1%TiC samples successfully with the size of about 20 mm in diameter and about 3 mm in thickness. Gradually, the performance of the TFGR-W1.1%TiC has been upgraded. The presentation will address our methodology to surmount the shortcomings of the conventional W materials and focus on prospective outcomes from the applications of the TFGR W alloys to proton-accelerator targets.
This program has been supported by KEK-MTC collaboration since 2016, the Joint Usage/Research Center PRIUS, Ehime University, Japan, and JSPS KAKENHI Grant Number19H01913.

Primary author: Mr MAKIMURA, Shunsuke (KEK, J-PARC)

Co-authors: Mr KIMURA, Atsuro (MTC); Prof. KURISHITA, Hiroaki (KEK); Dr OHFUJI, Hiroaki (Ehime University); Mr ISHIZAKI, Hiroyuki (MTC); Dr JUNG, Hun-Chea (MTC); Mr NIIKURA, Koichi (MTC); Dr ONOI, Masahiro (MTC); Dr SAKAMOTO, Tatsuaki (Ehime University); Mr NAGASAWA, Yutaka (MTC)

Presenter: Mr MAKIMURA, Shunsuke (KEK, J-PARC)

Session Classification: 6th Oral Session