



## Contents

### Proceedings of the 6th International Workshop on Spallation Materials Technology (IWSMT-6)

Foreword .....	vii
Contents .....	viii

#### Spallation facilities and R&D program

Construction status of the J-PARC project, <i>S. Nagamiya</i>	
Current status of 1 MW pulse spallation neutron source (JSNS) of J-PARC, <i>Y. Ikeda</i>	
R&D works on high-power targetry for neutrino factories, <i>K. Yoshimura</i>	
An edge-cooled graphite target for J-PARC Muon Science Facility, <i>Y. Miyake, S. Makimura, K. Nishiyama and K. Nagamine</i>	
Secondary beam production in the nuclear and particle physics facility in J-PARC, <i>K. Agari, Y. Hayato, E. Hirose, A. Ichikawa, J. Imazato, T. Kobayashi, M. Minakawa, T. Nakadaira, K. Nishikawa, H. Noumi, T. Ooyabu, Y. Sato, Y. Suzuki, H. Takahashi, S. Ueda and Y. Yamanoi</i>	
The second SINQ target irradiation program, STIP-II, <i>Y. Dai, X. Jia, R. Thermer, D. Hamaguchi, K. Geissmann, E. Lehmann, H.P. Linder, M. James, F. Gröschel, W. Wagner and G.S. Bauer</i>	
Optimized concept design of the target station of Chinese spallation neutron source, <i>Q.W. Yan, W. Yin and B.L. Yu</i>	
Material issues for the super neutrino beam and high-intensity spallation source (measurements using the multi-particle correlation), <i>H. Takahashi</i>	53

#### Cavitation erosion and fatigue

Summary of cavitation erosion investigations for the SNS mercury target, <i>J.R. Haines, B.W. Riemer, D.K. Felde, J.D. Hunn, S.J. Pawel and C.C. Tsai</i>	
Pitting damage by pressure waves in a mercury target, <i>M. Futakawa, T. Naoe, C.C. Tsai, H. Kogawa, S. Ishikura, Y. Ikeda, H. Soyama and H. Date</i>	70

Benchmarking dynamic strain predictions of pulsed mercury spallation target vessels, <i>B.W. Riemer</i>	81
Improved cavitation resistance of structural materials in pulsed liquid metal targets by surface hardening, <i>T. Koppitz, P. Jung, G. Müller, A. Weisenburger, M. Futakawa and Y. Ikeda</i>	92
Assessment of cavitation–erosion resistance of 316LN stainless steel in mercury as a function of surface treatment, <i>S.J. Pawel</i>	101
Estimation of pitting damage induced by cavitation impacts, <i>H. Soyama, M. Futakawa and K. Homma</i>	116
Characterization of a carburized surface layer on an austenitic stainless steel, <i>K. Farrell, E.D. Specht, J. Pang, L.R. Walker, A. Rar and J.R. Mayotte</i>	123
Fatigue properties of type 316LN stainless steel in air and mercury, <i>J.P. Strizak, H. Tian, P.K. Liaw and L.K. Mansur</i>	134
<b>Target, moderator and reflector</b>	
Technique for cladding of poison sheets for Cd-poisoned moderator, <i>M. Kawai, Y. Kobayashi, Y. Miyake, H. Inoue, M. Harada, M. Teshigawara, S. Saito, K. Kikuchi, A. Chiba, K. Sakaki, T. Yamamura, H. Kurishita, K. Konashi and K. Nakajima</i>	145
Cladding technique for development of Ag–In–Cd decoupler, <i>M. Teshigawara, M. Harada, S. Saito, K. Kikuchi, H. Kogawa, Y. Ikeda, M. Kawai, H. Kurishita and K. Konashi</i>	154
Neutronics performance and decay heat calculation of a solid target for a spallation neutron source, <i>D. Nio, M. Ooi, N. Takenaka, M. Furusaka, M. Kawai, K. Mishima and Y. Kiyanagi</i>	163
Thermal hydraulic design and decay heat removal of a solid target for a spallation neutron source, <i>N. Takenaka, D. Nio, Y. Kiyanagi, K. Mishima, M. Kawai and M. Furusaka</i>	169
Effect of proton beam profile on stress in JSNS target vessel, <i>H. Kogawa, S. Ishikura, H. Sato, M. Harada, S. Takatama, M. Futakawa, K. Haga, R. Hino, S. Meigo, F. Maekawa and Y. Ikeda</i>	178

**Radiation effects: spallation**

Mechanical properties and microstructure of AlMg <sub>3</sub> irradiated in SINQ Target-3, <i>Y. Dai and D. Hamaguchi</i>	184	Modeling tensile response and flow localization effects in 316SS after exposure to spallation and fission irradiation environments, <i>X. Wu, X. Pan, M. Li and J.F. Stubbins</i>	302
The high temperature three point bend testing of proton irradiated 316L stainless steel and Mod 9Cr-1Mo, <i>S.A. Maloy, A. Zubelewicz, T. Romero, M.R. James, W.F. Sommer and Y. Dai</i>	191	Defect structural evolution in high purity tungsten irradiated with electrons using high voltage electron microscope, <i>S. Fukuzumi, T. Yoshiie, Y. Satoh, Q. Xu, H. Mori and M. Kawai</i>	308
DPA calculation for Japanese spallation neutron source, <i>M. Harada, N. Watanabe, C. Konno, S. Meigo, Y. Ikeda and K. Niita</i>	197	Effect of ion irradiation and implantation of H and He on the corrosion behavior of austenitic stainless steel, <i>Y. Nemoto, Y. Miwa, Y. Kaji and T. Tsukada</i>	313
Radiation damage conditions for ESS target hull and irradiation rigs, <i>P. Vladimirov and A. Möslang</i>	205	Microstructural control to improve the resistance to radiation embrittlement in vanadium, <i>H. Kurishita, T. Kuwabara, M. Hasegawa, S. Kobayashi and K. Nakai</i>	318
Micro-hardness measurement and micro-structure characterization of T91 weld metal irradiated in SINQ Target-3, <i>X. Jia and Y. Dai</i>	212	Temperature and dose dependences of radiation damage in modified stainless steel, <i>S. Zhu, Y. Zheng, P. Ahmat, Y. Xu, D. Zhou, Z. Wang, E. Du, D. Yuan, Y. Zuo, Y. Ruan and X. Duan</i>	325
The effect of 800 MeV proton irradiation on the mechanical properties of tungsten at room temperature and at 475 °C, <i>S.A. Maloy, M.R. James, W. Sommer Jr., G.J. Willcutt Jr., M. Lopez, T.J. Romero and M.B. Toloczko</i>	219	Positron annihilation lifetime spectroscopy on heavy ion irradiated stainless steels and tungsten, <i>S. Zhu, Y. Xu, Z. Wang, Y. Zheng, D. Zhou, E. Du, D. Yuan, M. Fukuda, M. Mihara, K. Matsuta and T. Minamisono</i>	330
Ductility recovery in structural materials for spallation targets by post-irradiation annealing, <i>J. Chen, P. Jung, M. Rödig, H. Ullmaier and G.S. Bauer</i>	227	<b>Corrosion and metal compatibility</b>	
The tensile properties of AISI 316L and OPTIFER in various conditions irradiated in a spallation environment, <i>J. Chen, M. Rödig, F. Carsughi, Y. Dai, G.S. Bauer and H. Ullmaier</i>	236	Comparison of the corrosion behavior of austenitic and ferritic/martensitic steels exposed to static liquid Pb-Bi at 450 and 550 °C, <i>Y. Kurata, M. Futakawa and S. Saito</i>	333
Annealing effects on mechanical properties and micro-structure of F82H irradiated at ≤ 60 °C with 800 MeV protons, <i>Y. Dai, X. Jia and S.A. Maloy</i>	241	Expansion of solidified lead bismuth eutectic, <i>H. Glasbrenner, F. Gröschel, H. Grimmer, J. Patorski and M. Rohde</i>	341
Charpy impact tests on martensitic/ferritic steels after irradiation in SINQ target-3, <i>Y. Dai and P. Marmy</i>	247	Metallurgical study on erosion and corrosion behaviors of steels exposed to liquid lead-bismuth flow, <i>M. Kondo, M. Takahashi, T. Suzuki, K. Ishikawa, K. Hata, S. Qiu and H. Sekimoto</i>	349
Tensile properties of austenitic stainless steels irradiated at SINQ target 3, <i>S. Saito, K. Kikuchi, K. Usami, A. Ishikawa, Y. Nishino, M. Kawai and Y. Dai</i>	253	Investigation of the compatibility of tungsten and high temperature sodium, <i>Y.-L. Xu, B. Long, Y.-C. Xu and H.-Q. Li</i>	360
Microstructural study of EC316LN and its welds irradiated in SINQ target-3, <i>D. Hamaguchi and Y. Dai</i>	262	<b>Discussion and summaries</b>	
<b>Radiation effects: other conditions</b>		Report on summary session: Cavitation-erosion in mercury spallation neutron target source, <i>J.R. Haines</i>	366
LiSoR irradiation experiments and preliminary post-irradiation examinations, <i>H. Glasbrenner, Y. Dai and F. Gröschel</i>	267	Report on summary session: Materials issues in a high power spallation target, <i>S.A. Maloy</i>	367
Tensile properties of candidate structural materials for high power spallation sources at high helium contents, <i>P. Jung, J. Henry and J. Chen</i>	275	Report on summary session: Radiation damage in general, <i>P. Jung</i>	368
Radiation hardening and -embrittlement due to He production in F82H steel irradiated at 250 °C in JMTR, <i>E. Wakai, S. Jitsukawa, H. Tomita, K. Furuya, M. Sato, K. Oka, T. Tanaka, F. Takada, T. Yamamoto, Y. Kato, Y. Tayama, K. Shiba and S. Ohnuki</i>	285	Report on summary session: Spallation materials R&D: Remarks on progress and future, <i>L.K. Mansur</i>	370
Fundamental study of polonium contamination by neutron irradiated lead-bismuth eutectic, <i>T. Obara, T. Miura and H. Sekimoto</i>	297	<b>A tribute</b>	
		A tribute to Liping Ni, <i>G.S. Bauer</i>	372
		Author index	374
		Subject index	379