

High Field Laboratory for Superconducting Materials

Head : Prof. **Norio Kobayashi** (2001. 4~)

【Staff Members】

Prof : Kazuo Watanabe, Prof : Norio Kobayashi, Assoc. Prof : Keiichi Koyama, Assoc. Prof : Satoshi Awaji, Assoc. Prof : Takahiko Sasaki, Assoc. Prof : Tsutomu Nojima, Res. Assoc : Kohki Takahashi, Res. Assoc : Gan Nishijima, Res. Assoc : Iwao Mogi, <Technician : 2 / Researcher : 1 / Supporting Staff : 3>

【Research Activities】

The cryogen-free 30 T hybrid magnet constructed by a financial support from the Ministry of Education, Science and Technology is being tested for the full performance for the high magnetic field technology [1]. In the midterm goal, this developmental work has been positioned as the synthetic technology of the cryogenfree superconducting magnet [2]. Further, in the superconducting wire development, it was found that the Nb₃Sn superconducting properties are improved by a pre-bending strain treatment due to the reduction of the Nb₃Sn residual strain receiving from other wire constituent materials in high strength Nb₃Sn wires developed at the HFLSM [3]. At present, the mechanical properties improvement and understanding of the strain effect for Nb₃Sn wires become an essential issue in the development of high field superconducting magnets for 1 GHz-NMR, nuclear fusion, and accelerator magnets, and this work has received strong attention [4].

Magnetic field controlled high performance materials such as ferromagnetic shape memory compounds, giant magnetostrictive compounds, and magnetic refrigerants have been intensively studied using the high-field X-ray diffractometer with a cryogenfree split-pair superconducting magnet, and also using a newly developed apparatus under high field, low temperature, and high pressure [5]. The original data are very of interest, and some results have been presented as an invited paper at international or domestic symposiums.

The HFLSM annual report consisting of 72 research subjects is now ready to be published. In addition, a research pamphlet, which selects some important topics, will be prepared both in English and Japanese, and it will be distributed to principal institutes and universities in domestic and foreign countries.

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2. K. Watanabe., S. Awaji., G. Nishijima., K. Takahashi., K. Koyama., M. Motokawa.,
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3. S. Awaji., H. Oguro., G. Nishijima., K. Watanabe., K. Katagiri., K. Miyoshi., S. Meguro.,
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Enhancement of Upper Critical Field and Critical Temperature by Prebending Process for
Practical Nb_3Sn Wires,
Jpn. J. Appl. Phys., 43 (2004) L709-L711.
5. K. Koyama., M. Sakai., T. Kanomata., K. Watanabe.,
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 $Mn_{1.07}Co_{0.92}Ge$,
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【Plan】

At the High Field Laboratory for Superconducting Materials (HFLSM), the research subjects in respect of three important aspects of “High magnetic field technology and its relevant superconducting materials development”, “Materials science in high magnetic fields”, and “Discovery of the new phenomenon using multiple extreme conditions in high magnetic fields” are our mission of full-time research staff. In addition, the operation management of the HFLSM and cooperative research are the important task of user facilities.

