HIGH TEMPERATURE SUPERCONDUCTIVITY NEWS
PRODUCED BY
THE INTERNATIONAL ENERGY AGENCY'S (IEA)
TECHNOLOGY COLLABORATIVE PROGRAM (TCP) ON HTS[1]

FEBRUARY 2017

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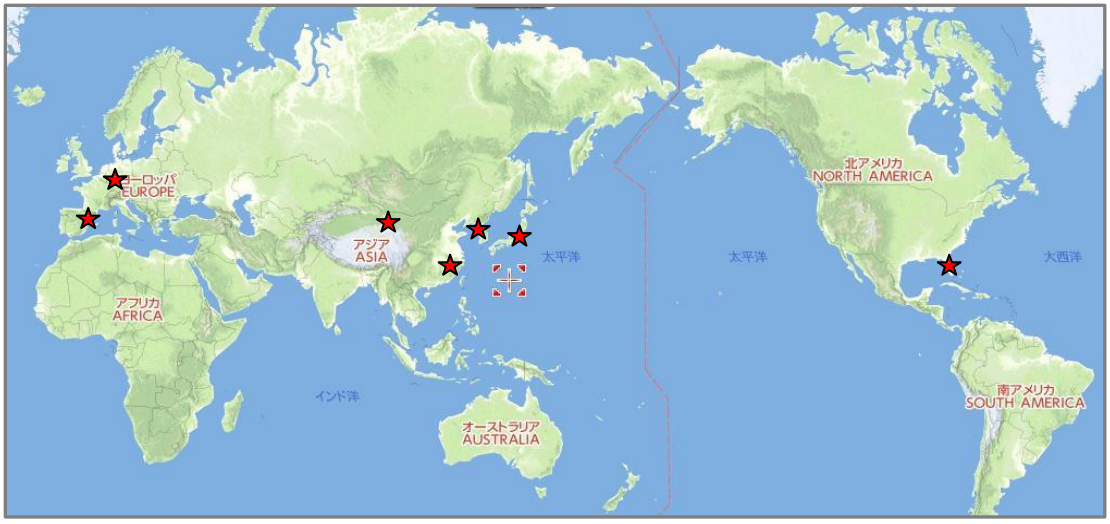


★News sources and related areas in this issue

[1] Developed by Yutaka Yamada and Brian Marchionini, Operating Agents for the IEA HTS TCP

29th International Symposium on Superconductivity Conference

The 2016 International Symposium on Superconductivity Conference (ISS) was held at the Tokyo International Forum (right) from 13–15 December. The conference was organized by the new superconductivity consortium Applied Superconductivity Constellations of Tsukuba (ASCOT) under the National Institute of Advanced Industrial Science and Technology (AIST). AIST is a National Research Institute at Tsukuba under METI.

More than 400 researchers attended the meeting, which was composed of 4 sessions: (1) Large Scale System Applications, (2) Wire and Bulk, (3) Electronic devices, and (4) Physics and Chemistry. Three relevant projects to the HTS TCP include two cable projects in Korea, new EU projects and a high field magnet in the United States. The next ISS will be held in Tokyo in 2017.[2]

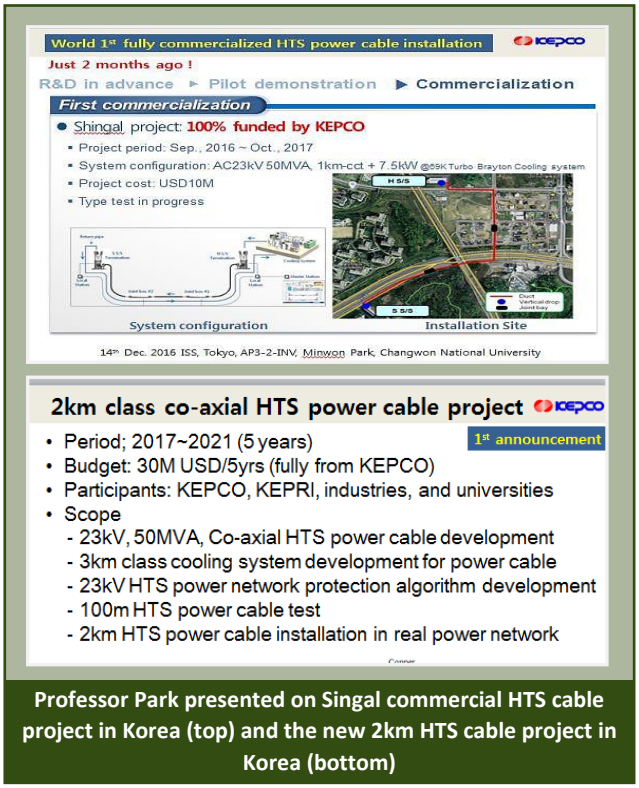
Tokyo International Forum

Korean Commercial Cable and New 2km Project

In his presentation, Professor Minwon Park of Changwon National University introduced two Korean HTS cable activities by the Korean Electric Power Corporation (KEPCO): a 1 km cable and a 2 km HTS Cable.

KEPCO is installing a 1 km cable near Seoul that will carry 22.9 kV, 50 MVA and utilize a 7.5kW turbo-brayton refrigerator. This cable will be a permanent part of KEPCO's electric grid to connect two substations. KEPCO held a ribbon cutting ceremony in September 2016 and plans to complete the installation by October 2017.

The 2 km HTS cable project will differ from **KEPCO's** 1 km commercial cable project both in length and cable structure (co-axial type). The project is aimed at providing important data on the economics of long length HTS cables. This will be the longest HTS cable demonstration in the world as the longest HTS cable demonstration up to this point has been 1 km.[3]



Professor Park presented on Singal commercial HTS cable project in Korea (top) and the new 2km HTS cable project in Korea (bottom)

"ISS is a unique conference that allows participants to learn about new projects and engage with R&D performers. Hopefully conferences of these types will continue in the future."

--Attendee at 2016 ISS Conference

[2] Dr.Yamasaki of ASCOT, "ISS 2016" (December 2016). https://www.tia-nano.jp/ascot/iss2016/index.html. h.yamasaki@aist.go.jp

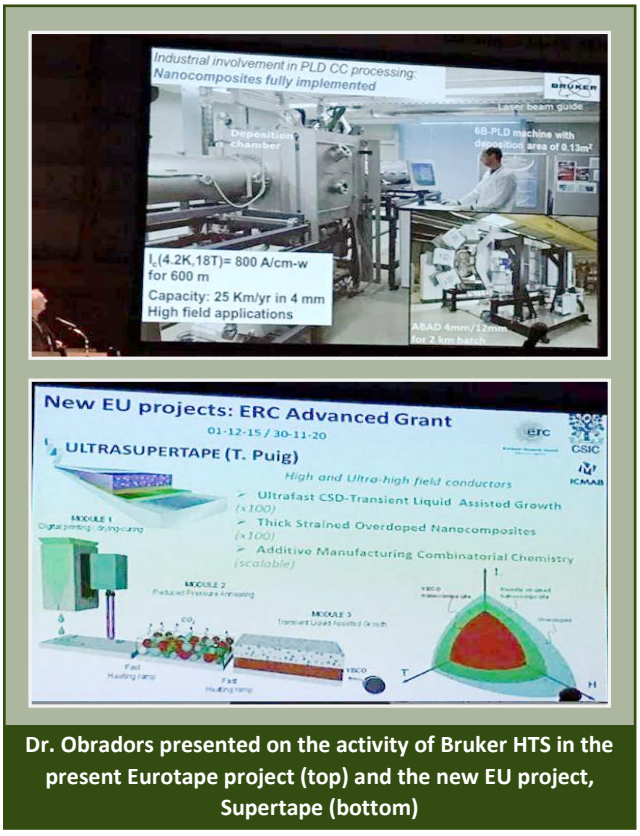
[3] 2016 ISS presentation by M. Park, "Korean Commercial Cable and New 2km Project" (December 2016). https://www.tia-nano.jp/ascot/iss2016/program/program.html. paku@changwon.ac.kr

New EU Projects Launched

Plenary lecturers Dr. Tabea Arndt (Siemens) and Professor Xavier Obradors (Institut Ciencia de Materials in Barcelona) introduced targets and plans for two new projects that are being developed in the EU: FASTGRID and Ultra-Supertape.

1. FASTGRID

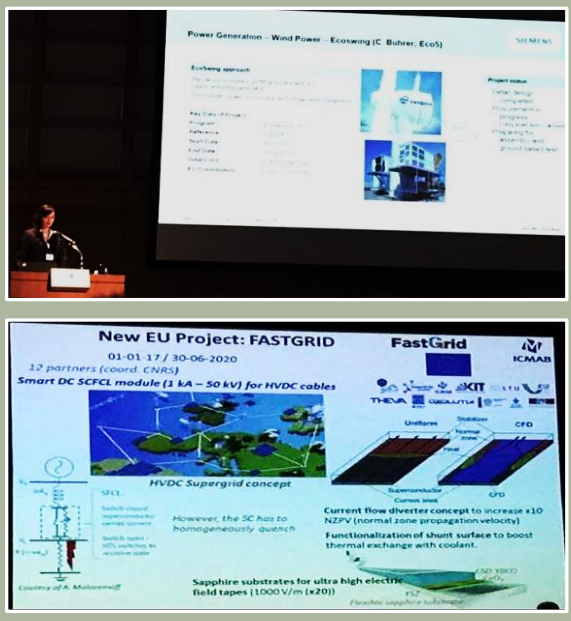
FASTGRID is 12-partner project launching a smart DC Fault Current Limiter (FCL) for 1kA-50kV HVDC Cables. EU countries are expected to construct an HVDC grid, but such a system needs a high-performance FCL to avoid electrical accidents. This project is expected to operate from January 2017 – June 2020.



Dr. Obradors presented on the activity of Bruker HTS in the present Eurotape project (top) and the new EU project, Supertape (bottom)

2. Ultra-Supertape

The Ultra-Supertape project was launched in December 2015 to further development from the Eurotapes project, which has shown promising results for industrialization of coated conductors. The Ultra-Supertape project is focused on high and ultra-high field conductors using various kinds of chemical synthesis methods such as Chemical Solution Deposition (CSD). This project will result in a faster and lower-cost coated conductor than has been produced before.[4]



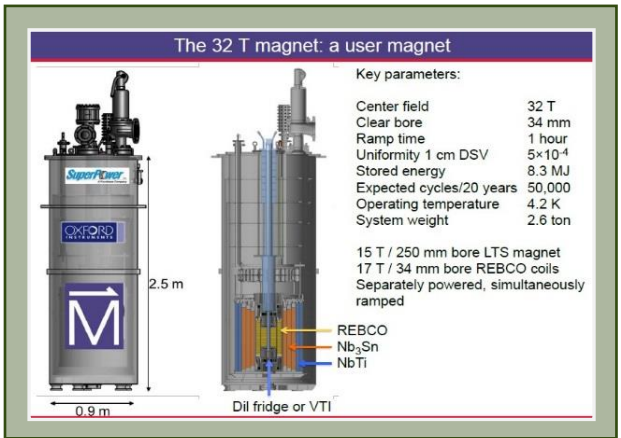
Dr. Arndt delivers a plenary talk at 2016 ISS (top) and Professor Obradors launched a new EU project, FASTGRID (bottom)

[4] 2016 ISS presentation by Dr. Tabea Arndt, "R&D in Electric Power Devices based on Superconducting Technology in Europe" (December 2016) https://www.tia-nano.jp/ascot/iss2016/program/program.html

2016 ISS presentation by Professor Xavier Obradors, "Progress in the Development of Nanostructured Coated Conductors in Europe" (December 2016) https://www.tia-nano.jp/ascot/iss2016/program/program.html

High-Field Magnet R&D at Florida State University

Dr. Weijers, at the National High Magnetic Field Laboratory (NHMFL) located at Florida State University, presented high-field magnetic R&D using a REBCO conductor, entitled "Construction and Test of the NHMFL 32T Superconducting Magnet." From 2011 – 2015, they ordered and tested more than 180 tapes and the I_c of the conductor was improved from approximately 250A at 4K, 17T to approximately 550A. However, the conductor may be further improved for a magnet by using a dog-bone geometric cross section and accounting for varying thickness and width. For example, the variations of the tape width result in variation of the height in each pancake coil. This can bring about incomplete heat conduction among the pancake coils.[5]



HTS 32T Magnet Specifications

HTS Roadmap

Luciano Martini (RSE), chairman of the IEA-HTS-TCP, has been invited to present in plenary on the HTS Roadmap of IEA-HTS-TCP at the Japan Society of Applied Physics (JSAP) 64th Spring Meeting in Yokohama, Japan. The HTS-TCP has been working on developing and disseminating the Roadmap results.

The JSAP meeting is the biggest and most popular academic conference in Japan, and has recognized efforts such as the Roadmap as important issues for further R&D of HTS moving forward. HTS researchers including Professor Larbalestier of Florida State University ("HTS conductors for high field magnets in the next 10 years") and Professor Nakamura of University of California, Santa Barbara (Nobel laureate for blue ray diode in 2014) have presented at this conference in the past.

Further details on the discussion at this meeting will be described in the next issue.[6]

Active HTS R&D in the Chinese Market

China has demonstrated an active interest in HTS R&D in the past several years. Dr. Yutaka Yamada, operating agent of the IEA-HTS-TCP, visited the Shanghai and Xian regions in 2016 to discuss HTS R&D with researchers at Shanghai Superconductor Technology (SSTC), Shanghai Creative Superconductor Technology (SCSTC), Shanghai Jiao Tong University, Shanghai University, Northwest Institute for Nonferrous Metal Research (NIN), and West Superconductor in Xian. China has also been a topic of several conferences, including EUCAS2015, ASC 2016 and the 1st Asian ICMC conference at Kanazawa in Japan, with presentations from Dr. Zhang of the Northwest Institute for Nonferrous Metal Research in Xian and Dr. Xiao of CAS, Beijing.

Dr. Yamada visit at SSTC, Shanghai

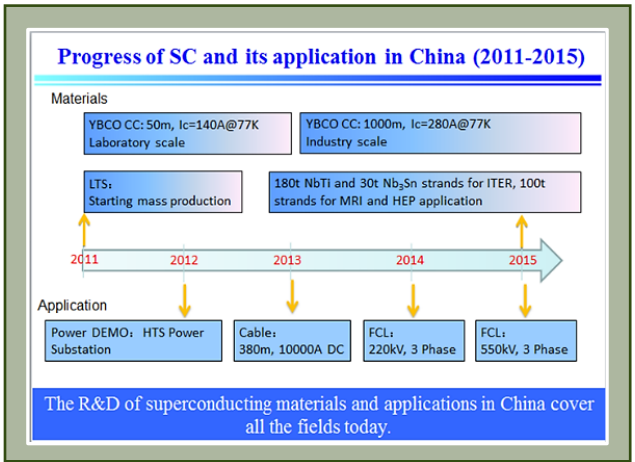
[5] 2016 ISS presentation (December 2016) https://www.tia-nano.jp/ascot/iss2016/program/program.html

[6] Prof. Chikumoto of Chubu University, nchiku@isc.chubu.ac.jp. http://meeting.jsap.or.jp/eng/index.html

From 2011-2015, the Chinese government has invested more than 700 Million RMB (~100 Million USD) in R&D of superconducting materials to large scale applications (see image on the right). The Chinese government has also invested in a similarly sized national program for basic science to ITER R&D.

Typical advancement of Chinese national programs for large scale applications can be seen in the slide to the left. REBCO, BSCCO, MgB_2, and Fe-based wires are now being actively produced or studies in areas including Shanghai, Xian, and Beijing. Based on the progress of the wire, various institutes in China are actively performing R&D on cable, FCL, and high-field magnet applications.

According to Professor Zhang of NIN, the Chinese government will continuously support superconductivity R&D through the 13th Five-Year Plan (2016–2020). Through this funding, Chinese HTS R&D has the potential to make steady progress in HTS application development.[7]



5 Year Progress in China (Prof. Zhang)

NEDO Meeting for HTS Power Applications and Regulations

New Energy and Industrial Technology Development Organization (NEDO) members for HTS in Japan gathered on December 12 to discuss the present status and the dissemination of HTS power application in the world. The meeting included representatives from universities, companies including Toshiba and Hitachi, and institutes including AIST and Central Research Institute of Electric Power Industry (CRIEPI) and began with presentations from Dr. Hayashi of SEI on worldwide HTS cable activity and regulations for superconductivity and cryogenic systems and Dr. Yutaka Yamada on the status of other power applications.

Following the initial presentations, members discussed obstacles for the integration of HTS electric grid products including cryogenics systems. For example, Japan's government has a strict rule for high pressure gas; however, the safety regulation needs to be clarified for public safety as it was enacted several decades ago and does not included coolants such as liquid nitrogen and neon used in current HTS applications. All members recognized that common rules, regulations, and standardizations across borders are needed for further development of HTS devices.[8]

R&D Programs in China

[7] 2016 1st ICMC-CSSJ conference and ASC 2016 presentation by Professor Zhang and Dr. Xiao. http://www.csj.or.jp/conference/1stAsianICMC-CSSJ50/. pxzhang@c-nin.com; xiao@mail.iee.ac.cn

[8] NEDO HTS meeting at NEDO office in Kawasaki, Japan (Dec. 12, 2016). Mr. Kinoshita of NEDO, kinoshitassm@nedo.go.jp and Yamada of SIT, yamadayu@sic.shibaura-it.ac.jp