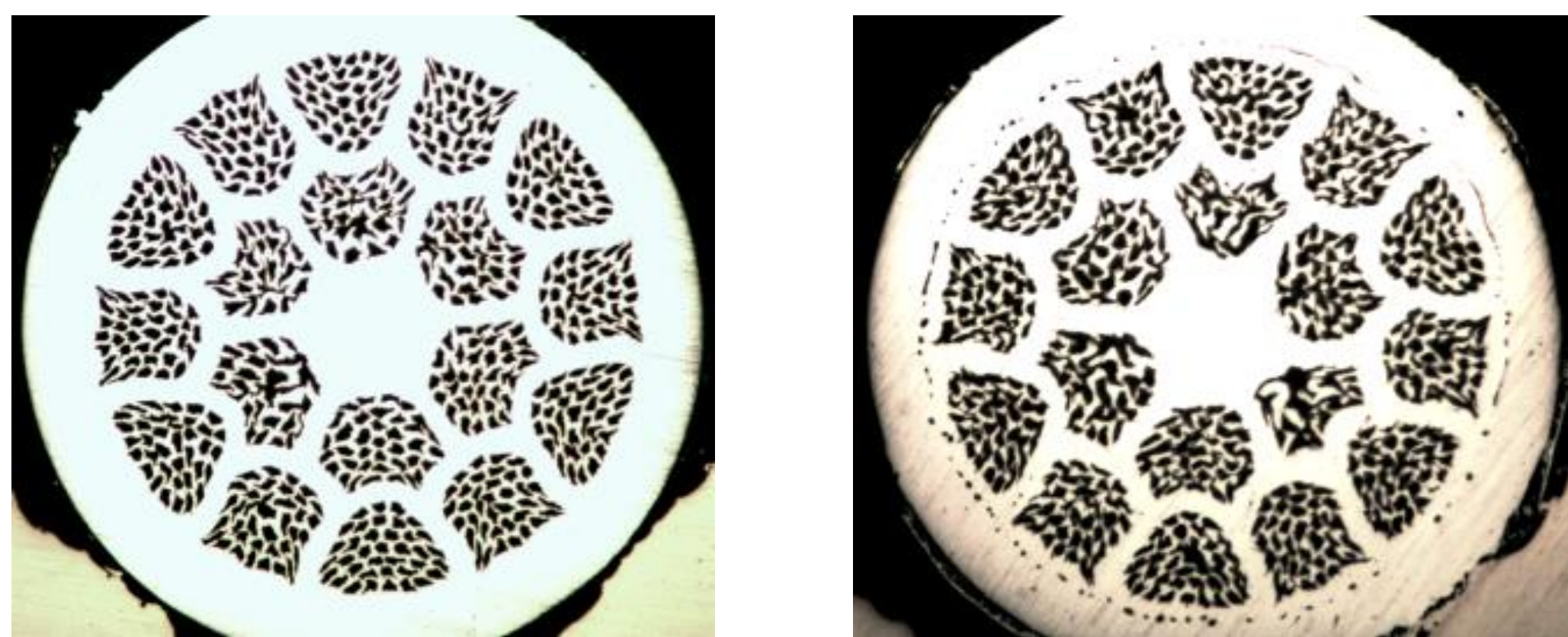


With very high upper critical magnetic field (H_{c2}) and critical current density (J_c), $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_x$ (Bi-2212) is one of the most promising materials for high field applications. Experimental research on Bi-2212 CICC is now carried out at ASIPP. One sub-size conductor cabled with 42 wires was manufactured in 2016. It was heat treated in flowing oxygen atmosphere with normal pressure. In order to improve the performance of Bi-2212 wires and CICC, high pressure heat treatment process was adopted this time. The new Bi-2212 CICC sample was tested at 4.2 K with self-field.

I. Bi-2212 CICC SAMPLE

The Bi-2212 wires used for the CICC sample were provided by Northwest Institute for Non-ferrous Metal Research (NIN). They were manufactured using PIT method with 19×18 configuration.



The cross-sectional micrographs of unreacted (left) and reacted (right) Bi-2212 RW

The cable was with 3 stage layout ($2 \times 3 \times (6+1)$) and the twist pitch of each stage were respectively 20 mm, 50 mm and 87 mm. There was no central spiral, but there was an Ag tube in between the SS jacket and the cable.



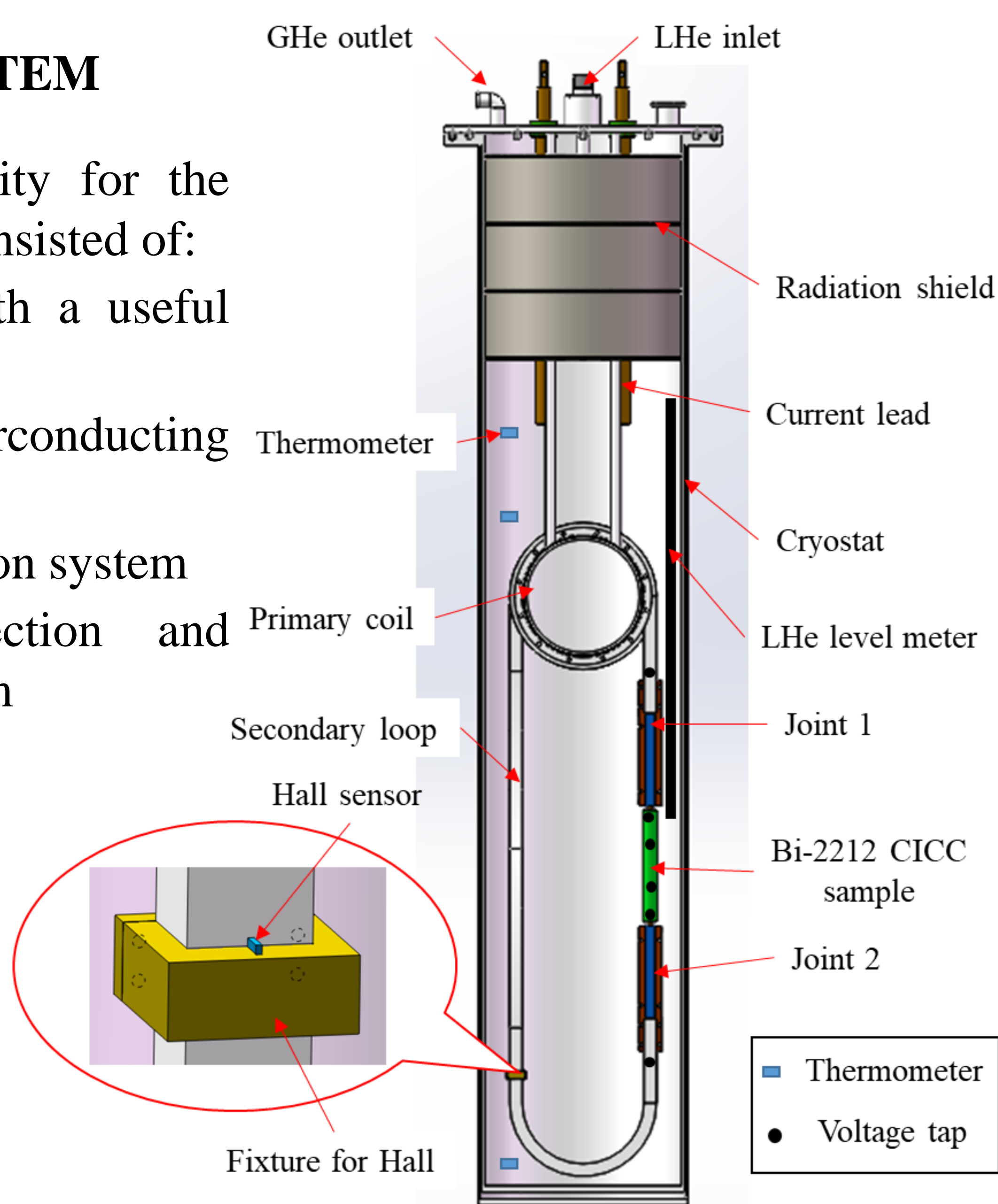
Bi-2212 CICC sample

The CICC sample was heat treated with high pressure of 50 atm in oxygen atmosphere.

II. TEST SYSTEM

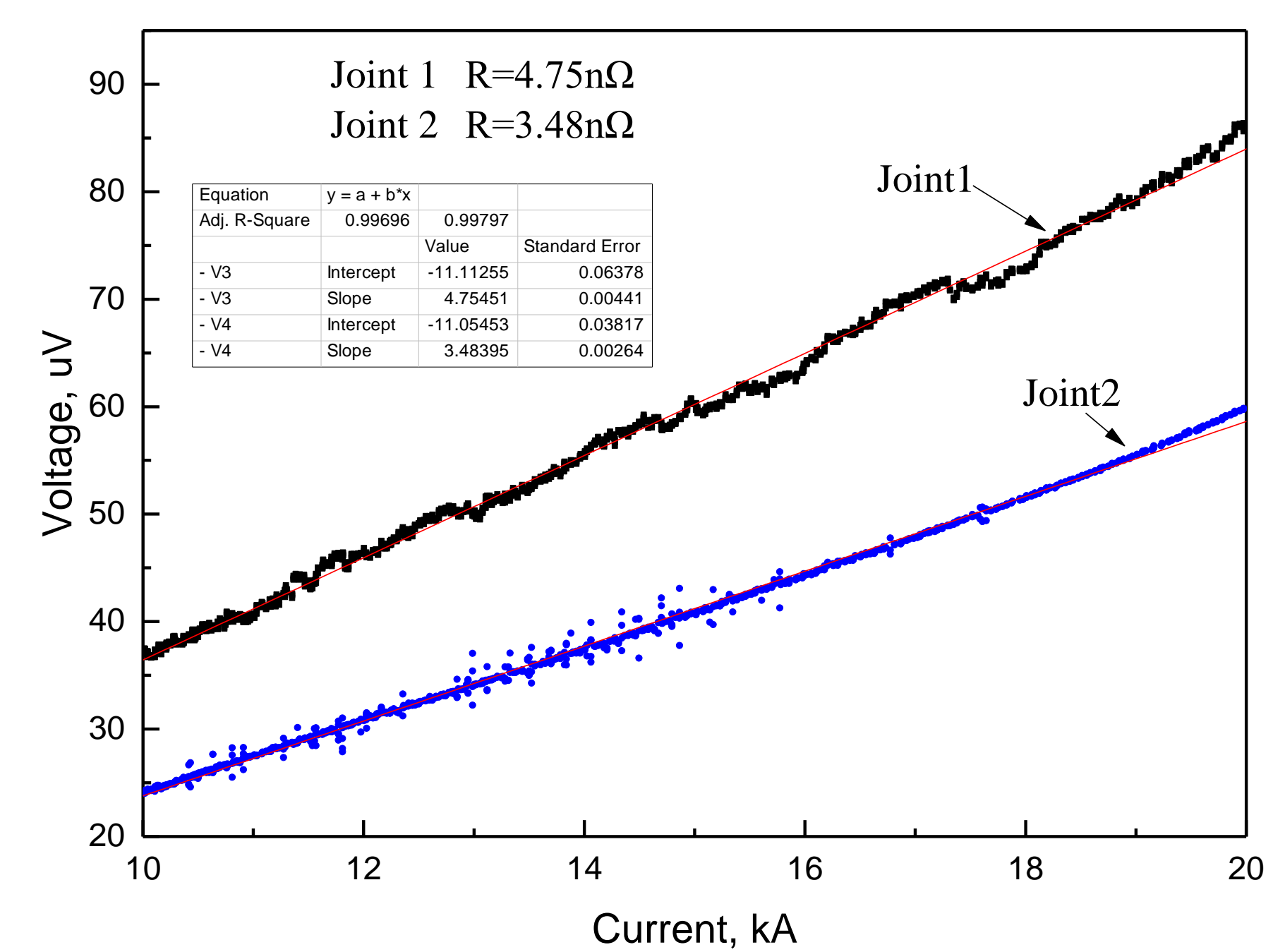
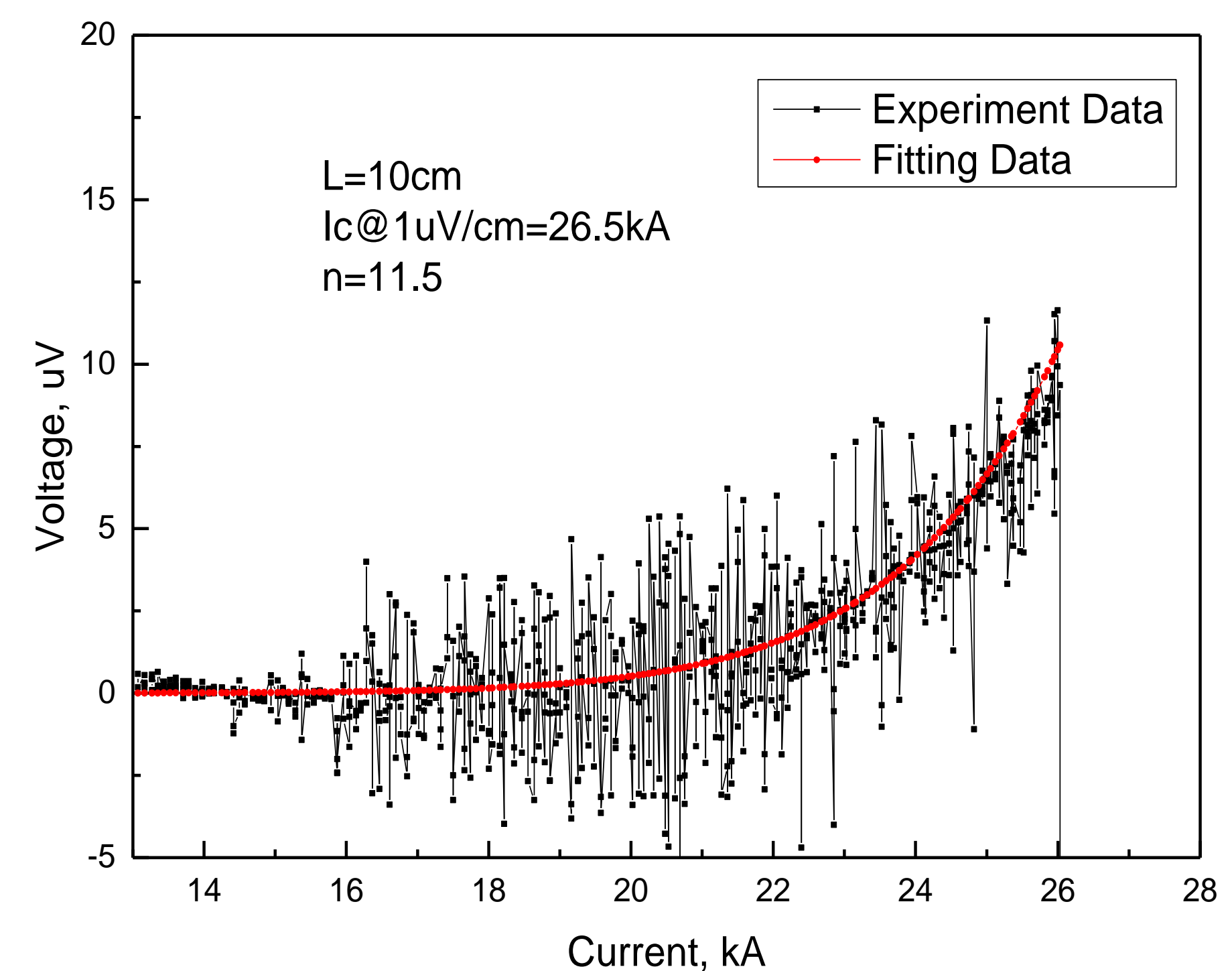
The test facility for the CICC sample consisted of:

- ◆ a cryostat with a useful bore of 300 mm
- ◆ a 30 kA superconducting transformer
- ◆ data acquisition system
- ◆ quench detection and protection system

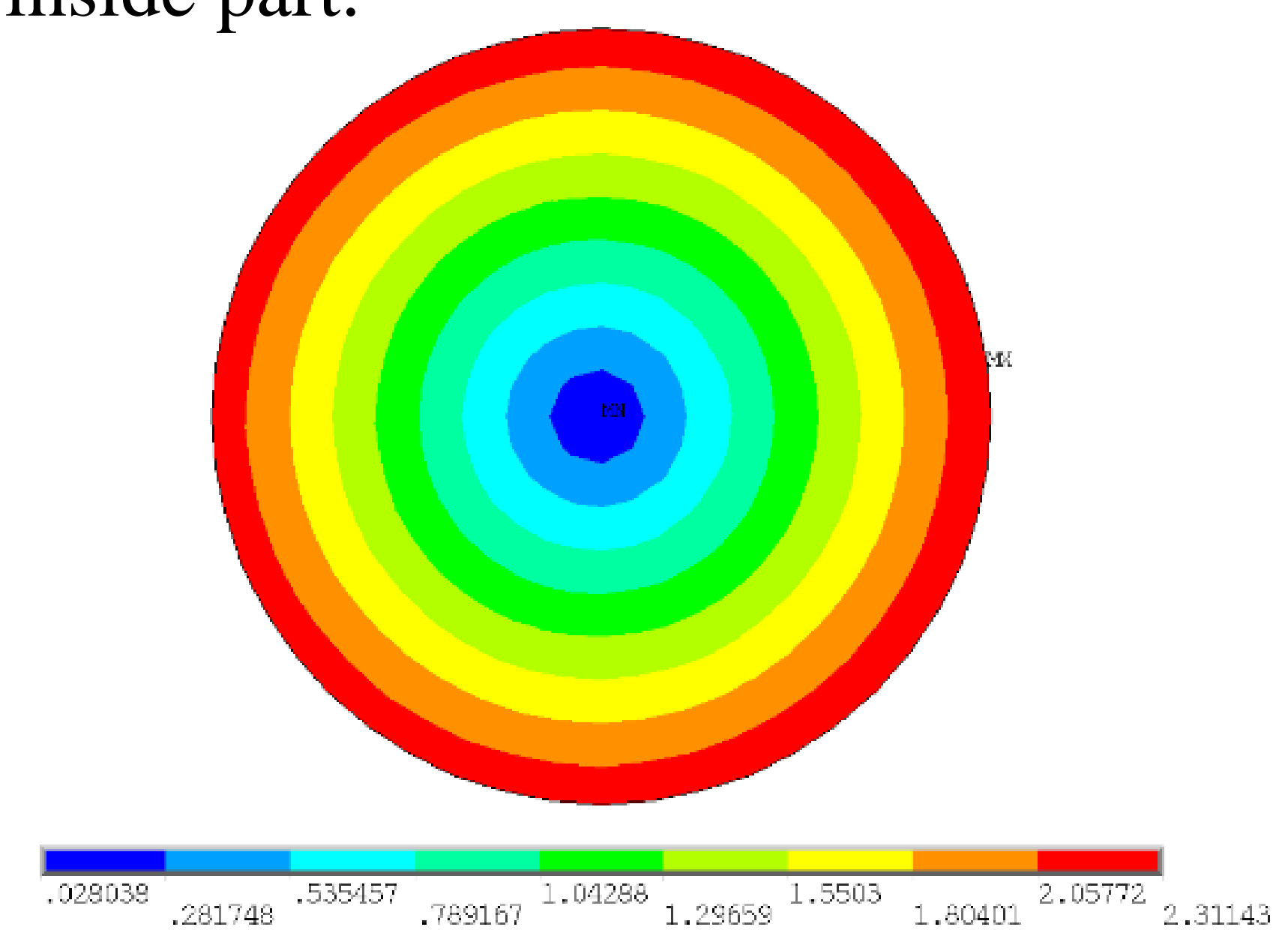


III. TEST RESULTS

The electric field strength criterion $1 \mu\text{V}/\text{cm}$ was used.



The distribution of self-field in Bi-2212 section (with maximum current of 26.5 kA) was computed by FEM method. The maximum self-field in Bi-2212 section was about 2.31T and occurred in the inside part.



The critical current of the newly developed Bi-2212 CICC sample at 4.2K, self-field was about 102% higher than that of the sample heat treated with normal pressure. The evaluated critical current was 28.1 kA. There was only about 5% degradation of the critical current after cabling and compaction.

The tested resistances of the two joints were 4.75 nΩ and 3.48 nΩ, respectively. This is much better than the last test results, which were 16.7 nΩ and 47.5 nΩ.

Further study on Bi-2212 CICC with background magnetic fields will be carried out.