



Effect of different bending diameters on the current-carrying capacity of iron-based superconducting tapes

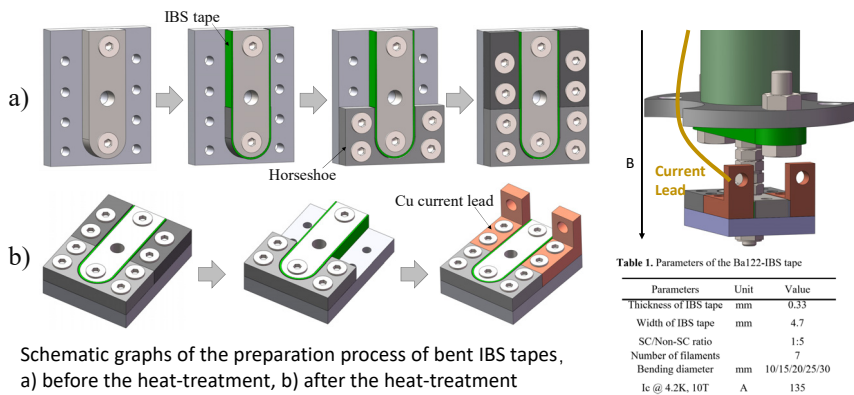


中国科学院高能物理研究所
Institute of High Energy Physics, CAS

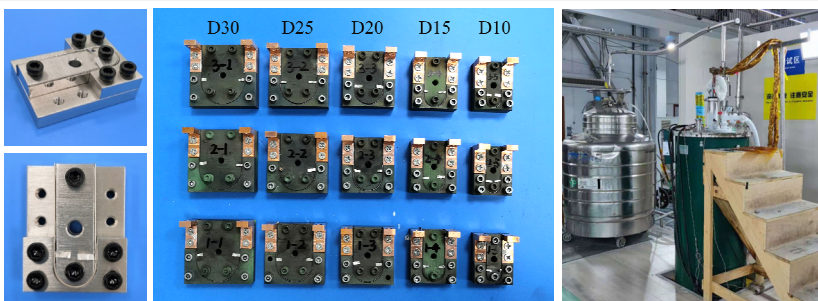
中科院高能所超导磁体组
Superconducting Magnet Group, IHEP

Chunyan Li¹, Rui Kang¹, Yanchang Zhu², Zhen Zhang¹, Yingzhe Wang¹, Chengtao Wang¹, Jin Zhou¹, Huanli Yao¹,
Xianping Zhang², Dongliang Wang², Cong Liu², Fang Liu³, Yanwei Ma^{2*} and Qingjin Xu^{1*}

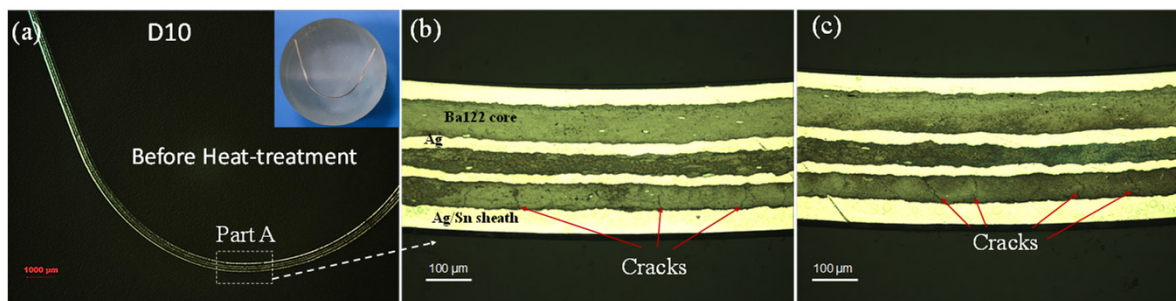
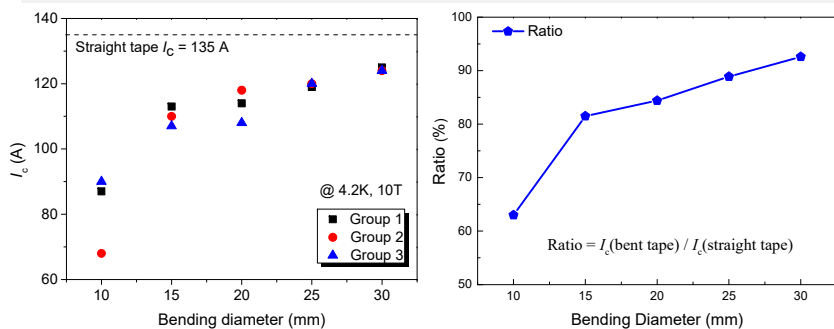
The iron-based superconductor (IBS) is a good candidate for high field magnet applications. The bending effect and properties of IBS tapes were systematically investigated in this work. The bent $Ba_{1-x}K_xFe_2As_2$ (Ba122/Ag/AgSn) 7-filamentary tapes with different bending diameters ($D=10, 15, 20, 25, 30$ mm) were prepared by wind-and-react method. **The current-carrying capacity of bent IBS tapes was tested and compared. The observation of inner superconducting cores and the stress analysis of bent tapes were also conducted to clarify what happened in bent IBS tapes.**



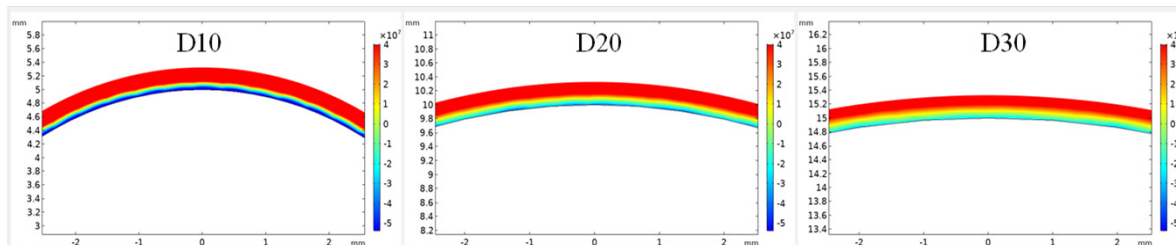
✓ A special mechanical structure was designed to prevent the heat-treated IBS tapes from being damaged again during soldering and testing.



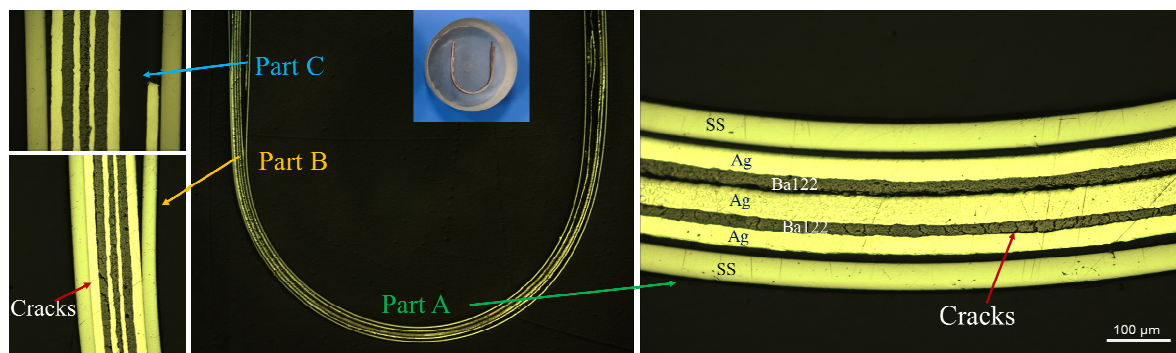
✓ The bent IBS tapes with different bending diameters were prepared;
✓ The I_c of bent IBS tapes decreases with smaller bending diameters.



✓ Before heat-treatment, D10 tape shows that cracks appearing regularly in part of the superconducting cores under tensile stress.



✓ The simulated stress distributions of the D10, D20 and D30 bent tapes were obviously different.
✓ The cracks observed in D10 tape were due to the large tensile stress.



✓ After heat-treatment, a large amount of cracks still can be seen in the D10 tape.
✓ No crack was found in the superconducting core that is not stressed or subjected to compressive stress.