

HTS superconductor wire: \$5/kAm by 2030?

Vladimir Matias¹ and Robert H. Hammond²

¹iBeam Materials, Inc., Santa Fe, NM, USA

tel: +1-505-577-3193, fax: +1-505-216-9780, vlado@ibeammaterials.com

²Geballe Laboratory for Advanced Materials, Stanford University, USA

Four years ago we posited that coated conductor (CC) wire can be manufactured at a cost of less than \$5kA/m. Based on the price trends for CCs in the last 10 years and the achieved improvements in performance we believe that once there is sufficient demand for wire, i.e. 100,000 km per year, that the price of wire should indeed come down to \$5/kAm, and production cost should be even lower than that. We estimate that this should occur in the time frame 2025-2030 and that by 2020 the price should already come down to \$20-40/kAm.

Currently there is a vibrant CC industry with about 20 producers or intended producers of CCs worldwide. Four of the five largest producers of CCs are using the IBAD-MgO texturing process for fabricating the superconductor template. We believe the trend in the use of IBAD-MgO will continue although there are viable alternatives. Despite the requirements for vacuum deposition and complex deposition control, IBAD-MgO is extremely fast (process has been demonstrated in less than one second) and therefore high-throughput and low-cost. The in-plane texture FWHM for the YBCO on top of our IBAD-MgO textured tape has been shown to be 2-3°. At this level of alignment the HTS critical current is not limited by grain boundaries and several groups have already demonstrated 1000 A/cm-width on IBAD-MgO templates. Solution Deposition Planarization or SDP™ is a cost-effective way to get to the required smoothness for the IBAD-MgO process. The combination of SDP and IBAD further allows for a new design of CC's that includes several superconducting layers in the architecture.