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Overview on Progress, Challenges and Frontier Research of Coated Conductors for Applications

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***Abstract*—Coating Conductors (CC) are major achievements of the high Temperature Supercoducting (HTS) era, covering many aspects of materials science and engineering. They have become enabling materials to overcome society needs upon an impressive interdisciplinary and long cooperative effort between research labs and industry. The community has learned to control the pinning microstructure landscape to increase performance, manufacturers have demonstrated how to fabricate long and robust HTS Coated Conductors with high performances, and many engineering devices have shown their superiority. Providentially, we are now at one of the most exciting times for these materials, with their expansion into several emerging applications and the race for large volume production has started. In this presentation I will outline the current aspects of coated conductors that limit their widespread use and the role that materials science can play in mitigating these factors. In particular, I will discuss about the fundamental aspects of materials processing (higher growth rate, large areas, Ic for large thicknesses) and how different deposition techniques can influence these aspects. I will also summarise the current knowledge on vortex pinning and the optimisation of the pinning landscape for different applications. Furthermore, application-relevant aspects such as ac-losses, mechanical strength, length, homogeneity, cost and some application-specific customisations will be discussed.**

***Keywords (Index Terms)*—Superconducting materials, Coated Conductors, film growth, vortex pinning, other properties, conductors, manufacturing companies**

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