

## Highly Efficient Preparation of Double-sided YBCO Thin Films with MOCVD

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**Abstract**—Low cost and high efficiency production of multicomponent oxide thin films, such as YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7-x</sub> (YBCO), is essential for high-temperature superconductor (HTS) application. Double-sided thin films could improve microwave device performance and increase the engineer current density of coated conductors but with challenges for both-sides equality deposition. Most of thin film deposition methods had got success in preparation of high quality single-sided YBCO films on different substrates. Metal-organic chemical vapor deposition (MOCVD) is suitable for double-sided thin film deposition with easy vapor flow controlling. Two different MOCVD systems had been developed for deposition of YBCO thin films on crystal substrates and metal tapes. Both of the two system are with showerheads to spray vapor source flowing on both sides of substrate, but with different heating methods, which one is radiant heating for crystal substrate and the other is self-heating for metal tapes. With optimised deposition parameters, high quality epitaxial double-sided YBCO thin films could be obtained on 3-inch LaAlO<sub>3</sub> substrates and on buffered Hastelloy C-276 tapes. The transformation temperature of YBCO thin films is about 90 K. The critical current density is higher than 3 MA/cm<sup>2</sup> at 77 K and zero field. The microwave surface resistance is much lower than 1 mΩ at 77 K and 10 GHz. Considered with the high deposition rate, MOCVD could be the champion in large-scale production of double-sided HTS thin films.

**Keywords (Index Terms)**—YBCO thin films, double-sided, MOCVD, deposition rate

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