COMMENTS AND REPLY

Comments on papers previously published in Journal of Materials Research and replies from the author of the original paper are published together in this section.

Comments on "Ion beam sputter deposition of $YBa_2Cu_3O_{7-\delta}$ thin films" [J. Mater. Res. 8, 3032 (1993)]

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In this brief letter we want to comment on several statements published recently in the *Journal of Materials Research* by our former co-workers Kellett and James (KJ) in the paper entitled "Ion beam sputter deposition of $YBa_2Cu_3O_{7-\delta}$ thin films".

KJ have presented some results on ion beam deposition of YBCO films that were carried out at the Swiss Federal Institute of Technology in Lausanne (EPFL, Switzerland) until early 1991. The detailed results of this research have already been published elsewhere by Gauzzi *et al.*[2,3] Hence, here we present the comments on the aforementioned KJ article, based on detailed and comparative data concerning the single target and the multitarget ion beam sputtering technique which were determined in our laboratory and are in our records.

The essence of our interpretation can be summarized as follows:

(1) KJ present the multitarget ion-beam deposition (or co-deposition) technique as an improvement over the single-target technique. From our results, the opposite is true, since x-ray scans on co-deposited films systematically indicate the presence of secondary phases. On the other hand, the scans on the films deposited in the single "123" target configuration exhibit only weak lines of CuO.[2] Hence, stoichiometry control is automatically achieved by using the single-target configuration, while it is difficult to achieve and reproduce it with the multitarget configuration.[2,3]

(2) KJ use a convincing example of the sharp resistive transition at 92 K (ρ vs T, Fig. 12) of the film from run #354, implying it was obtained by the multitarget ion beam sputtering technique. This work was done in our laboratory, and according to our laboratory records, film was deposited with the single-target configuration with a beam current and voltage of 20 mA and 500 V, respectively. Furthermore, the high T_c's and sharp transitions reported in the paper have never been obtained with the multitarget configuration, but only with the single-target configuration.

Therefore, our initial, complex multitarget technique[4,5] has been abandoned in our laboratory starting from run #348 (October 1990). The multitarget configuration always produced films with T_c's typically <80 K; resistive transitions are broad and the composition of the films deviates significantly from the "123" composition.[4,5] The main reason is that it is difficult to reproduce the same beam conditions from run to run for several ion sources operating simultaneously.

As mentioned above, since October 1990 we use much a simpler single-target technique operated at low ion-beam energy.[2,3] Such a simplified technique indeed produces high quality, reproducible YBCO films with the desired "123" composition and excellent structural[7] and electrical properties.[6,7]

In conclusion, in our view, the KJ paper[1] may be misleading to other workers. The present state of art for ion beam sputtering of cuprates is not the multitarget co-deposition, but rather a simple, single target sputtering as reported in detail in Refs. 2 and 3.

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