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Effect of Deposition Conditions on Composition of rf-sputtered Bi-Sr-Ca-Cu-O Thin Films

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**Abstract:** The effect of rf-magnetron sputtering conditions on as-deposited film composition using a stoichiometric  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_y$  (Bi-2212) target was investigated in an on-axis configuration, as the stoichiometrical control of the film is the most important parameter for the proper study of film characteristics. It was found that substrate target distance up to 55-60 mm may provide a film composition close to the target composition. The sputtering chamber pressure effecting film composition, especially in respect of Bi, is an important parameter which needs very precise control. Bi ratio in the deposited films increases with increasing Ar pressure while Sr and Ca are not much affected. After 12 hours presputtering, a target can have a steady state for long subsequent period of 60 hours or more. Target aging and increasing chamber pressure reduce the deposition rate of the film. Considerable variation of composition was not observed over large area of about 4 cm diameter circle. The peeling off of films during ex-situ annealing, even at rather low temperatures, such as below 500°C is also discussed.

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