RECENT ACHIEVEMENTS IN SERIAL CO-SPUTTERING

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ABSTRACT

Magnetron sputtering [1] is a mature key technology for the development and manufacturing of functional layers. However, it still suffers from several draw backs: (i) Fixed target composition, which cannot be changed during deposition, e. g. for the manufacturing of gradient layers, (ii) Coupling of process parameters, e. g. unwanted, temperature and reactive gas pressure dependent Zn-desorption in reactive magnetron sputtering of ZnO:Al and thus, coupling of process parameters such as deposition temperature and oxygen partial pressure, (iii) complex in-situ control and (iv) poor energy efficiency due to small sputter yield. The serial-cosputtering [2] opens up pathways to circumvent these issues. It consists of a rotating target as the main source which is coated by an assisting source. By means of vacuum and plasma simulation, we developed a modified process module for serial co-sputtering using industrial standard equipment which enables reactive gas pressure separation from main to assisting source [3]. This is crucial for the precise modification of the main target with dopant atoms or sputter yield enhancing material. We present our latest achievements for tailored growth of transparent conductive oxide e. g. for CIGS thin film solar cell application.

References

[1] G. BRÄUER, B. SZYSZKA, M. VERGÖHL and R: BANDORF, Vacuum 84 (2010) p. 1354
[2] A. BELKIND, Z. ORBAN, S. BERG and P. CARLSSON, Journal of Vacuum Science and Technology A 11/2 (1993) p. 314
[3] V. SITTINGER, A. PFLUG, W. DEWALD, S. JUNG, C. BRITZE, A. KAISER, W. WERNER, B. SZYSZKA, G. BRÄUER, Vacuum 114 (2015) p. 158