14th International Conference on

Plasma Based Ion Implantation & Deposition

PBII&D 2017

New World Shanghai Hotel

October 17-20, 2017, Shanghai, China

Program

Organized by

Shanghai Institute of Ceramics, Chinese Academy of Sciences (SIC CAS)
Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences (SIMIT CAS)

14th PBII&D Committees

Organizer

Shanghai Institute of Ceramics, Chinese Academy of Sciences
Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences

International Organizing Committee

P. K. Chu (Chairman)	Hongkong, China
M. Bilek	Australia
N. Huang	China
S. Mändl	Germany
A. Márquez	Argentina
L. Pichon	France
X. B. Tian	China
M. Ueda	Brazil
R. H. Wei	USA

Local Organizing Committee

Xuanyong Liu (Chair)	Shanghai Institute of Ceramics, CAS
Zengfeng Di (Co-Chair)	Shanghai Institute of Microsystems and Information Technology, CAS
Yongfeng Mei	Fudan University
Zhenghua An	Fudan University
Zhongying Xue	Shanghai Institute of Microsystems and Information Technology, CAS
Huiliang Cao	Shanghai Institute of Ceramics, CAS

ID 13

A three-dimensional numerical simulation model of magnetron sputtering target

Fan Zhang[1], Deli Tang[1], Pingchuan Li[1], Hao Wu[2], Ricky K. Y. Fu[2], Paul K. Chu[2]

1. Southwestern Institute of Physics, Chengdu 610041, China
2. Department of Physics and Materials Science, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China

Keywords: magnetron sputtering, simulation, plasma behavior, target utilization efficiency, power efficiency

Abstract: In order to reduce the producing costs, optimization of magnetron sputtering target is not only about increasing target utilization efficiency, but also about increasing power efficiency. Thus numerical simulation results about these two factors are necessary. For that reason, a 3D numerical simulation model based on an existing structure is built.

Information about target utilization efficiency and power efficiency can be obtained by simulation results of plasma behavior in magnetron discharge. Analysis of ion trajectories, energy and incident angle distribution indicates that sputtering ion proportion decreases from 80% to 67% with the discharge voltage increasing from 260V to 340V, and excessively high discharge voltage is not beneficial to increase power efficiency. On the other hand, increasing discharge voltage facilitates ions to impact target with higher mean kinetic energy, which is beneficial to increase sputtering yield. Therefore, choosing a proper discharge voltage according to working pressure is an effective way to increase power efficiency.

Since the reliability of simulation model is verified by comparison of ion sputtering position distribution and target actual erosion profile, simulation and analyzing methods in this paper are useful for optimization design of magnetron sputtering target.

Corresponding:
Email: zf750132022@163.com