Titanium nitride thin films for applications in thin film resistors

Nguyen Duy Cuong[a], Dong-Jin Kim[b], Byoung-Don Kang[a,b], and Soon-Gil Yoon[a]*

[a]*Department of Materials Science and Engineering, Chungnam National University, Daeduk Science Town, 305-764, Daejon, Korea.*

[b]*KMC technology, Panam Techno-Town 103,Panam-dong 239-2, Dong-gu, 300-130, Deajon, Korea.*

Corresponding author: sgyoon@cnu.ac.kr

Abstract

Titanium nitride thin films were deposited on SiO_2/Si substrate by rf-reactive magnetron sputtering. The structural and electrical properties of the films were investigated with various $N_2/(Ar+N_2)$ flow ratios (nitrogen/argon flow ratio). The resistivity as well as temperature coefficient of resistance (TCR) of the films strongly depends on phase structure. For the films deposited at nitrogen/argon flow ratio of below 5%, the resistivity increased with increasing nitrogen/argon flow ratios. However, the resistivity of the film deposited at nitrogen/argon flow ratio of 7% decreased drastically; it is even smaller than that of metal titanium nitride. A near-zero TCR value of approximately 9 ppm/K was observed for films deposited at nitrogen/argon flow ratio of 3%.

Key words: titanium nitride, thin film resistor