The development of quaternary nitride films for the diffusion barrier by co-sputtering system

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In solid state diffusion, grain boundary and extended defects are main diffusion path of impurities. The amorphous nitride films have no grain boundary and extended defects, therefore nitride films can be a good candidate of diffusion barrier. In this work, quaternary nitride films of W-B-Si-N were selected as a candidate of diffusion barrier materials. The W-B-Si-N films were deposited on Si substrate at 120℃ by co-sputter system. The prepared samples were annealed at 800℃ and 1000℃ for 1 hour. Scanning electron microscopy (SEM), transmission electron microscopy (TEM) and X-ray diffractometer (XRD) were employed to study the microstructure and the morphology.