Orissa Journal of Physics
ISSN 0974-8202

Vol. 23, No.1
February 2016
pp. 61-64

High Energy Photoemission study of Ta_2O_5 grown on Si

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Received : *11.12.2015* ; *Accepted : 9.01.2016*

Abstract : Good quality Ta_2O_5 films of thickness less than 1 nm were deposited on p-type Si(100) and investigated the thermal stability in Ultra High Vacuum (UHV). As deposited films contained very little sub-oxide of Si which transformed into SiO_2 upon vacuum or oxygen annealing. Decomposition of Ta_2O_5 on Si(100) started at around 550^0C and completely got converted to sub Ta oxides at 750^0C. Flashing at about 850^0C produced a doublet structure indicative of stable sub Ta oxides. Similar doublet structure was observed for Ta sub oxide films independently prepared but were not observed for Ta silicide films. As deposited Ta_2O_5 films consumed considerable amount of oxygen when annealed under ambient oxygen indicating oxygen deficiency in as-deposited films.

Keywords : Photoelectron Soectroscopy, Synchrotron radiation, Oxide, Thin film, Annealing

PACS Numbers : 79.60.-I, 79.60.Dp, 68.47.Gh

[Full Paper]