

SILVER THIN FILMS DEPOSITED BY INJECTION MOCVD

M. ABOURIDA^a, H. GUILLON^b, C. JIMENEZ^b, J. M.
DECAMS^b, O. VALET^a, P. DOPPELT^a

^a ESPCI, Centre d'Etudes de Chimie Métallurgique
(CNRS-UPR 2801), CVD Group, 10 rue Vauquelin,
75231 Paris Cedex 05, France

^b JIPELEC, 11 Chemin du Vieux Chêne, 38240 Meylan,
France

email : pascal.doppelt@espci.fr
phone : + 33 1 40 79 45 28
fax : + 33 1 40 79 44 25

Owing to their good volatility, fluorinated compounds have been up to now the most commonly used MOCVD silver precursors [1] but the drawback is that deposited films are often contaminated by fluorine impurities. However, less volatile silver carboxylate compounds can be of good value since they do not contain fluorine, and are known to have appropriate thermal stability. Thus, silver carboxylates ($\text{Ag}(\text{O}_2\text{CR})$, R = alkyl) constitute an alternative class of precursors for Ag CVD metallization which, until very recently [2, 3], appear to have been largely overlooked.

This work describes the successful use of a mesitylene solution of silver pivalate as MOCVD precursor. To overcome the problem of poor volatility of these silver carboxylate, we used a Jipelec Inject liquid delivery and vaporization system. Nitrogen carrier gas and oxygen or hydrogen reagent gas were used at a reactor pressure of 5-15 Torr with deposition temperatures ranged from 200 to 400°C.

We found significant dependence of the surface morphology on the deposition conditions, mainly on temperature and gas reagent (Figure 1 and 2). Interesting results were observed, since continuous silver films with near bulk resistivities, were grown. A comprehensive study of the dependence of Ag film thickness, microstructure and crystallographic orientation on the main process parameters was elucidated.

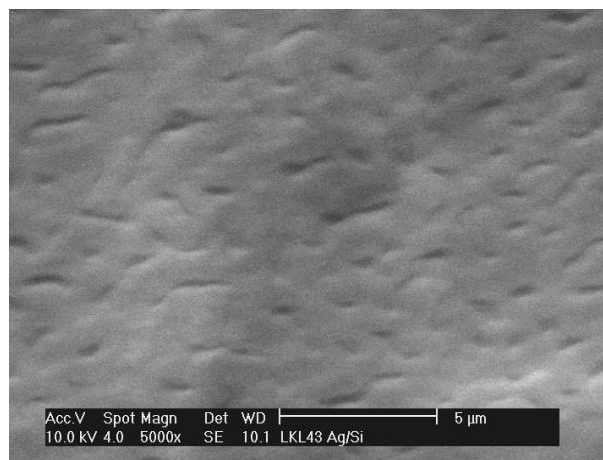


Fig. 1 : SEM image for silver film deposited onto SiO_2/Si substrate at 300°C (under hydrogen)

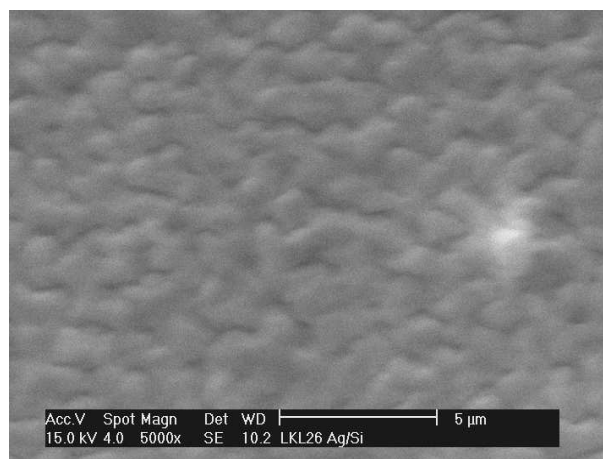


Fig. 1 : SEM image for silver films deposited onto SiO_2/Si substrate at 250°C (under oxygen)

References

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