

Activation of getter films for MEMS packaging studied by in situ NRA

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Several kinds of microsensors need vacuum to operate properly and vacuum is generally obtained by a packaging process with a getter film. The main role of the getter is to sorb the gases outgassed inside the package cavity during its hermetic sealing. The aim is to achieve vacuum at the end of the sealing process [1]. Activation of the getter consists in dissolving its native oxide to regenerate a free metallic surface. We investigated the activation of getter films by in situ Nuclear Reaction Analysis (NRA).

$Y_{89}Al_{11}$, $Y_{31}Ti_{69}$, $Y_{43}V_{57}$ and $Y_{44}Zr_{47}Al_8$ films were co-evaporated under ultra-high vacuum on silicon wafers. Getter films were activated by annealing under 3×10^{-6} mbar air pressure with a $5 \text{ }^\circ\text{C}/\text{min}$ ramp rate from ambient temperature to $500 \text{ }^\circ\text{C}$. The global oxygen content (see Figure) and oxygen profile in the films were monitored during annealing by in situ NRA.

The lowest activation temperature is measured for Y-V but evolution with the temperature differs depending on the alloy. Observation of the oxygen profiles shows also that activation of a getter film on the studied range of temperature follows distinct steps, depending on the alloy: dissolution of the native oxide, sorption of oxygen or carbon, oxydation.

References:

[1] A. Bosseboeuf et al, Sens. & Mater., Vol. 31, No. 9, 2019

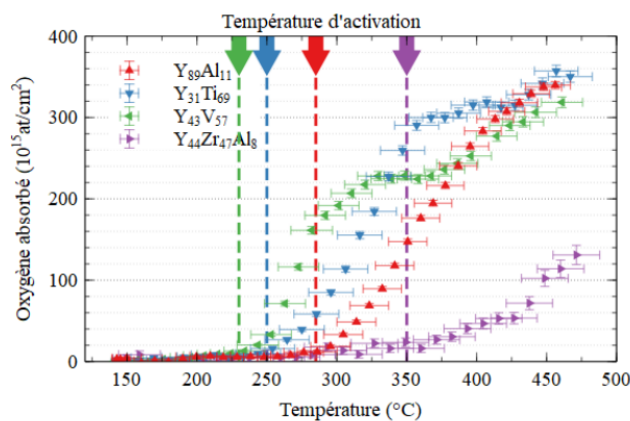


Figure V-12 : Nombres d'atomes d'oxygène absorbés et estimation des températures d'activation selon l'alliage Y-M par NRA in situ temps réel