

Laboratoire de production Microtechnique EPFL - STI - IPR - LPM CH-1015 Lausanne Switzerland

Frank Seigneur frank.seigneur@epfl.ch
Jacques Jacot jacques.jacot@epfl.ch



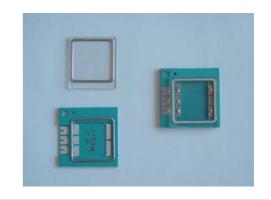
Laser Soldered Packaging Hermeticity Measurement Using Metallic Conductor Resistance

F. Seigneur, T. Maeder, J. Jacot Ecole Polytechnique Fédérale de Lausanne (EPFL)

Goal of the project

The goal is to develop a hermetic packaging method for microsystems, which fulfils the following requirements:

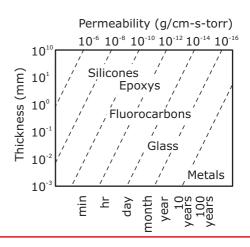
- Achieve long-term hermeticity to water and oxygen
- Minimise thermal impact on the microsystem during the sealing operation



Hermeticity

Plastic joints and glues are not hermetic in the long term. $2\mu m$ of aluminium are more hermetic than 10 mm of plastics.

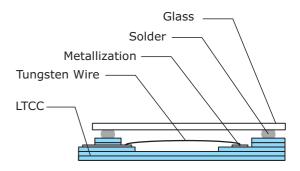
One part of the package is metallic, the other part is made of glass. The goal is to solder the two parts of the packaging by using a laser diode. The advantages of the laser soldered joint are its hermeticity to water and air in regard to glue and plastics, as well as the possibility to heat only the soldered joint.



Hermeticity measurement

The hermeticity is measured through the oxidation of a heated tungsten wire.

The resistance of the conductor, which is encapsulated inside the package, increases as oxygen and water diffuse through the seal and react with the hot wire, progressively consuming the tungsten.



Results and future work

- Longer life-time and less oxidation of the wire are observed for hermetically sealed packages.
- In hermetic packages, metal oxidation is observed due to entrapped impurities.
- Wire oxidation is a simple, low cost measuring method.
- Future development will concentrate on making the method more quantitative.

