

1. PAPER TITLE: tbd. Development of a Flexible Tag Microlab

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3. PRESENTATION PREFERENCE: Oral Presentation

4. PRINCIPAL AUTHOR'S BIOGRAPHY Approximately 50 words.

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Degree in Physic Sciences in 1995 by the University of Cantabria. In 2001, she obtained her PhD in Physics at the Physics Department of the University of Oviedo. Then, she joined TEKNIKER, that sponsored her to get a MSc degree in Microsystems and Nanotechnology at Cranfield University in 2002. Since October 2002, she is a researcher of the Micro and Nanotechnology Department at Tekniker, working on MEMS fabrication technologies.

5. ABSTRACT TEXT Approximately 250 words.

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The objective of this work is the development of a microlab on flexible tag capable to monitor the quality of the food, during transport, storage and vending. The idea is to bring together different gas sensor technologies that will be integrated into a data communication environment for online food monitoring during the logistics chain.

The proposed solution is the concept of silicon chips and microcomponents assembled and integrated on top of a flexible substrate acting mainly as a passive interconnect structure.

Three technologies have been identified as necessary to get the final integration:

- a) Substrate technology. This technology refers to the realisation of the flexible substrate with the metallic interconnections.
- b) Assembly technology to integrate the discrete components on the flexible substrate. The processes tested are wire bonding, flip chip, and tape bonding.
- c) Encapsulation technology and windows opening over the sensible areas.

The first flexible tag prototype integrates two different metal oxide sensor arrays with a commercial microprocessor. The dimensions are 43 mm long, 22 mm wide and about 2 mm thick and two metal levels are necessary for the interconnect.

Regarding the substrate technology, different approaches are being evaluated, with the aim of identifying the best solution. All of them rely on the use of Pyralux copper-clad laminated composites, constructed of DuPont Kapton polyimide film with copper foil on one or both sides, as flexible substrate. The copper interconnections are generated by standard photolithography and wet etching. On the other hand, the vias definition in Kapton is performed either by photolithography and dry etching, or directly by femtosecond laser ablation. For the implementation of the two metal layer realisation two alternative processes are being tested. One of them consists in bonding two Pyralux foils, whereas the other one combines both sides Cu deposition, patterning, contacting through the foil and Pyralin (photopatternable liquid polyimide) coating.

6. KEYWORDS Maximum of five keywords.

Flexible tag, polymer materials, gas sensors, integration.