GREEN TAPE CERAMICS AS NOVEL PLATFORMS FOR OPTICAL SYSTEMS

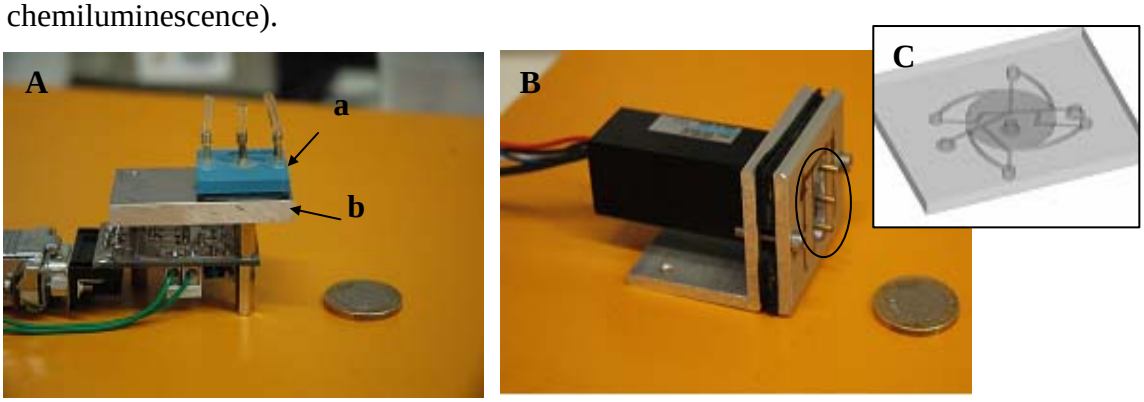
Mar Puyol[1], *Núria Ibáñez-García*[1], *David Izquierdo*[2], *Francisco Villuendas*[2], *Julián Alonso*[1]

[1] Grup de Sensors i Biosensors. Departament de Química. Universitat Autònoma de Barcelona.
[2] Department of Applied Physics, Universidad de Zaragoza
e-mail: MariaDelMar.Puyol@uab.es, nuria.ibanez@uab.es

Innovation in the optical sensor technology is focused on the development of more sophisticated technologies, which permit to integrate additional stages of sample treatment in conjunction with all the chemistry of optical recognition and transducing in order to obtain compact and robust analytical systems, capable of rapidly and continuously supplying analytical information of environmental parameters. The scaling down of analytical systems is one of the main challenges of a great number of researches coming from different scientific areas as it potentially improves in some respects the efficiency of conventional laboratories.. However, limitations on the employed technologies and materials exist. For instance, due to the lack of versatility of the typical fabrication techniques and materials (silicon, glass, polymers), it is a challenge to monolithically integrate the electronic control of devices and actuators in the same fluidic platform.

In the last years, the strategies of our research group have been aimed at the miniaturisation of optical sensors (absorbance and fluorescence), the compatibility/integration of the selective recognition phase and the miniaturisation of fluidic systems. We have constructed a versatile platform for the development of ion-selective integrated optical sensors by means of the IC microtechnology and a system comprised of miniaturised optical components as a first approach in luminescence. Recently we have been making use of the Low Temperature Co-fired Ceramics (LTCC) technology as an alternative to other fabrication techniques such as the IC microtechnology. Its methodology based on a multilayer approach, not only enables the construction of complex three-dimensional fluidic devices, but also the integration of detection systems, as well as their electronic control, by means of standard screen-printing techniques.

In this work, we combine the advantages of the LTCC technology with the experience achieved in our group in the field of miniaturised optical systems to construct different fluidic platforms in order to carry out optical detection (absorbance, fluorescence and chemiluminescence).



A: LTCC vortex cell (a) onto a photodetector (b). B: Attachment of the same LTCC device to a photomultiplier. C: Inner 3D structure of the vortex cell.