

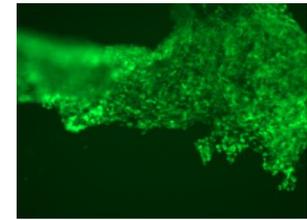
Multicomponent hydrogels for *in vitro* cell manipulation

The Spanish National Research Council (CSIC) in collaboration with Universidad Complutense de Madrid (UCM) has developed a new generation of multicomponent hydrogels based on vinylpyrrolidone that can be obtained in a simplistic one step process. These hydrogels exhibit improved mechanical properties, even when highly swollen, in comparison with hydrogels based only on vinylpyrrolidone. They are appropriate for application in tissue engineering or reconstructive medicine. In particular, these hydrogels are suitable to produce substrates for *in vitro* cell manipulation.

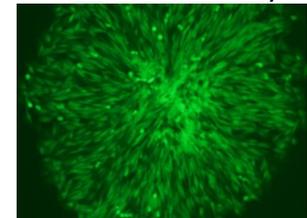
An industrial partner in biomedicine or biotechnology interested in further development and a license agreement for the exploitation of this technology is sought

A progress in tissue engineering and reconstructive medicine

Currently, advanced technologies for *in vitro* cell layer formation, detachment and transplantation use thermosensitive systems based on poly n-isopropylacrylamide (pNIPAm). They are capable of hosting cells until confluence and cell detachment is induced by temperature modulation. However the methodology associated with pNIPAm cell regeneration substrate fabrication is expensive and complex since it requires the production of ultra-fine films. Recently, a group of researchers of CSIC and UCM has developed polymer hydrogels based on several components such as vinylpyrrolidone and an anionic acrylic monomers. The preparation of the hydrogel is carried out in one step by means of a conventional radical polymerization. Therefore, the method is simple and inexpensive in comparison with complex and laborious techniques used for the preparation of ultra-fine thermosensitive supports.



Cell sheet detached from hydrogel



Cell sheet transplanted from a hydrogel post hydrogel removal

Main innovations and advantages

- Cellular growth on the hydrogels yields monolayers; therefore there is no need to prepare ultra-fine supports.
- The hydrogels are capable of hosting cells to confluence and then cell sheets can be detached in just seconds by simple mechanical agitation without the need for temperature changes or the addition of chemical agents or enzymes.
- Clinical compliancy in cell culture and tissue engineering tends to avoid animal derived products such as trypsin, which is almost ubiquitously used for cell detachment. These supports offer an alternative route.
- The manipulation and transport of the hydrogel to a transplantation site is enabled since the hydrogels are not anchored to any substrate in contrast to pNIPAm grafted surfaces.
- Cell sheets can be transplanted to a site of choice by simply inverting the hydrogel onto the site of choice; then the hydrogel can be removed while the cell sheet preferentially attaches to the target site.

Patent Status

Spanish patent filed with possible international extension

For more information, please contact:

Patricia Thomas V, Ph.D
 Material Science Area
 Deputy Vice-Presidency for
 Knowledge Transfer
 Spanish National Research Council
 (CSIC)
 Tel.: +34 91 561 34 41
 Fax: +34 91 564 48 53
 E-mail: patricia.thomas@ictp.csic.es

