

# PEPTIDE GELS FOR 3D CELL CULTURE

## BACKGROUND

Commercial scaffolds for cell culture are widely used in drug discovery, cell biology and oncology, and form part of the \$1.6B world wide cell based and screening analysis market. Historically, this has used 2D platforms but 3D cell matrices are increasingly used to provide a more accurate representation of such 'wet environments'. We conservatively estimate that there are some 165,000 researchers actively engaged with *in vitro* cell culture worldwide.

## THE TECHNOLOGY

*Required performance of gels for 3D Cell Culture:*

(1) Ease of cell distribution; (2) Neutral pH; (3) Handling at 37°C (body temperature); (4) Rapid, reproducible gelation under mild conditions; (5) Good and tuneable mechanical stability (similar to that of tissue); (6) Uniformity of gel at the nano, micro and macroscopic levels; (7) Longevity in culture/*in vivo*; (8) Ease of biological functionalisation.

None of the existing commercial gel products accurately represent all of the above. Our peptide gels show significant improvement for the majority of these characteristics. In particular, they can be tailored to suit different cell types, including mesenchymal stem cells, chondrocytes, fibroblasts and hepatocytes both for 2D and 3D culture, and have mechanical properties which can be tailored to match those of natural tissue scaffolds.

## KEY BENEFITS

Compatible with range of cell types; fully synthetic; gels are stable under biologically acceptable conditions; short peptide chains enable design flexibility; incorporation of biologically functional molecules.

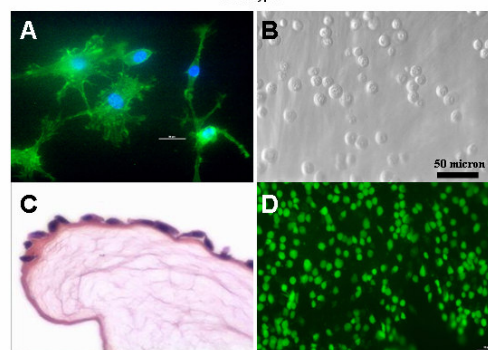
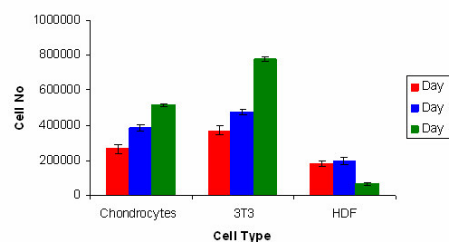
## OPPORTUNITY

Gels are now available for evaluation by industry and academe. For further information contact [ri@strath.ac.uk](mailto:ri@strath.ac.uk)

## REFERENCES

- 1 WO2007/029003 – "Method of Preparing a Hydrogel"
- 2 US20070099840 – "Hydrogel Compositions"
- 3 M. Zhou, A.M. Smith, A.K. Das, N.W. Hodson, R.F. Collins, R.V. Ulijn, J.E. Gough, Self-assembled peptide-based hydrogels as scaffolds for anchorage dependent cells, *Biomaterials*, 2009, *in press*.
- 4 V. Jayawarna, S.M. Richardson, A.M. Hirst, N.W. Hodson, A. Saiani, J.E. Gough, R.V. Ulijn, Introducing Chemical Functionality in Fmoc-Peptide Gels for Cell Culture, *Acta Biomaterialia*, 2009, *in press*.

KEYWORDS: Peptide, Enzyme, Biomaterial, Biomedicine, Cell Culture, Cell Biology, Hydrogel, Polymer, Protease, Regenerative Medicine, Tissue Engineering



**Figure 1:** LDH assay showing proliferation of chondrocytes, 3T3 and Human dermal fibroblast (HDF) cells cultured on the peptide gels. A: Fluorescence microscopy image showing the organisation of F-actin filaments; B: chondrocytes retain rounded morphology on gel surface by optical microscopy; C: Histology of chondrocytes stained with haematoxylin and eosin; D: Live/dead staining of chondrocytes.