

**Τίτλος**

**«Microfluidics in biomaterials for bone tissue engineering applications»**

**«Μικροροές σε βιοϋλικά για ιστοτεχνολογικές εφαρμογές ανάπλασης οστού»**

**Μπαμπαλιάρη Ελευθερία**

Μεταπτυχιακή Φοιτήτρια

Τμήματος Επιστήμης και Τεχνολογίας Υλικών, Πανεπιστημίου Κρήτης

Επιβλέπουσα Καθηγήτρια κ. Μ. Χατζηνικολαΐδου

**Τετάρτη, 1<sup>η</sup> Απριλίου 2015,**

**ώρα 13:30**

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**Περίληψη / Abstract**

**Microfluidics in biomaterials for bone tissue engineering applications**

In recent years, tissue engineering has emerged as a promising field for the development of new bone graft substitutes in order to overcome the limitations of the current bone grafts. However, besides the selection of the biomaterial and the cell source, several other issues should be considered, including the optimization of the *in vitro* culturing system. Conventional static cell cultures have been proven inadequate to provide sufficient levels of oxygen and nutrients at the interior of the biomaterials, and mechanical stimulation to the cells.

It has been reported that dynamic culturing of cells in biomaterial constructs has a positive effect on cell proliferation and differentiation. Considering this approach crucial for the tissue maturation, and taking into account the dynamic *in vivo* situation, we focused on setting up a new microfluidic system, which, together with the development of a biomaterial substrate for the cells, would be appropriate for the investigation of dynamic biological experiments. The aim of the present work is to study the proliferative and osteogenic behavior of pre-osteoblastic MC3T3-E1 cells in

a microfluidic system that allows continuous and homogenous feeding of cells, and compare them with static culture conditions. The investigation of the dynamic culture was performed by employing two different substrates, gelatin films and a collagen fibrous network.