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ABSTRACT

THREE-DIMENSIONAL FABRICATION OF BIOCOMPATIBLE STRUCTURES IN ANATOMICAL SHAPES AND DIMENSIONS FOR TISSUE ENGINEERING AND ORGAN REPLACEMENT

The present invention relates to methods and apparatuses involving biocompatible structures for tissue engineering and organ replacement and, more specifically, to methods and apparatuses involving biocompatible structures formed by three-dimensional fabrication for tissue engineering and organ replacement. In some embodiments, the biocompatible structures are scaffolds for cells that can be used as tissue engineering templates and/or as artificial organs. The structures may be three-dimensional and can mimic the shapes and dimensions of tissues and/or organs, including the microarchitecture and porosities of the tissues and organs. In some cases, a structure formed by three-dimensional fabrication comprises a wall defining a cavity and a plurality of pores in at least a portion of the wall. The pores may permeate the wall and enable exchange of a component (e.g., a molecule and/or a cell) between a portion interior to the cavity and a portion exterior to the cavity. For instance, pores may allow delivery of molecules, cell migration, and/or generation of connective tissue between the structure and its host environment. Structures of the invention can be implanted into a mammal, or alternatively and/or additionally, can be used ex vivo as bioartificial assist devices.

FIG. 9A