



## Synthetic Elastic Polymer/Collagen Fibril Biocomposite for Artificial Tissue Design

**R**esearchers at the University of South Florida have developed a novel biocomposite material that combines biotic and abiotic material for the use in artificial tissue replacement surgeries.

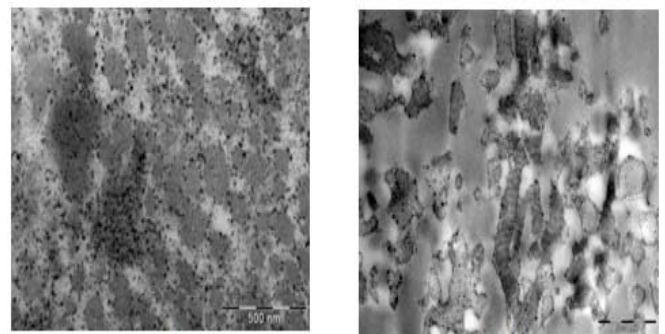
The term “biocomposite” means a material that consists of two or more distinct constituents to obtain complex physicochemical, mechanical, and biological properties, which are required by biomedical applications and cannot be satisfied by any of the individual components. These materials play an important role in advancing the field of tissue engineering and serve as scaffolds designed to replace, repair, and sustain organ structures, or they can be incorporated into medical devices that contact blood or bodily tissues. In the past decade, numerous biocomposites have been developed for a variety of tissue-engineering applications. However, there is a strong demand for new materials owing to the limitations of current materials used, which includes: mechanical material failure, material-associated infection, and immunogenic reaction to implanted materials. It would therefore be advantageous to have available a biocomposite material that circumvents the problems associated with the current medical practices involving prosthetic materials.

To address this need, our researchers have invented a novel class of collagen fibers with improved biomechanical properties through a process that combines collagen fibrils with polymeric nano-particles. These new fibers display unique features which allow them to have the potential to be used in numerous areas of tissue design, including but not limited to heart valve replacements, artificial skin replacement, and ligament and tendon replacement. To alter their mechanical properties and increase their versatility and biocompatibility, numerous polymeric materials and mammalian fibrils in varying ratios, can be incorporated into the system.

### Advantages:

- Increased structural soundness
- Decreases the risks of autoimmune response
- Decreases the risks of post-operative infection at the site of implant
- Potentially improves the overall efficiency and affordability of numerous tissue engineering surgeries

### *Improved Collagen Fibers for Tissue Engineering*



A

B

**Fig 1: Transition Electron Microscopy of:**  
(A) control collagen fiber  
(B) nanoparticle treated fiber

Tech ID # 06B095

