

First Laureate Fundamental Research

- **Research Work Title:** Nano- and microfabricated hydrogels for regenerative engineering
- **Researcher:** Prof. Alireza Khademhosseini
- **Country of Residence:** USA
- **Scientific Affiliation:** Harvard University



Abstract:

Engineered materials that integrate advances in polymer chemistry, nanotechnology, and biological sciences have the potential to create powerful medical therapies. Prof. Khademhosseini has engineered tissue regenerative therapies using water-containing polymer networks, called hydrogels that can regulate cell behavior. Specifically, he has developed photocrosslinkable hybrid hydrogels that combine natural biomolecules with nanoparticles to regulate the chemical, biological, mechanical and electrical properties of gels. These functional scaffolds induce the differentiation of stem cells to desired cell types and direct the formation of vascularized heart or bone tissues. He has pioneered concepts of making conductive hydrogels by integrating nanomaterials including carbon nanotubes, graphene, and reduced graphene oxide into materials. To create tissue complexity, he has also developed directed assembly techniques to compile small tissue modules into larger constructs. It is anticipated that such approaches will lead to the development of next-generation regenerative therapeutics and biomedical devices.

Biography:

Mr. Ali Khademhosseini is a Professor of Medicine and Health Sciences and Technology at Harvard-MIT's Division of Health Sciences and Technology and the Harvard Medical School. His research is based on developing micro and nano-scale technologies to control cellular behavior with particular emphasis in developing microscale biomaterials and engineering systems for tissue engineering and drug delivery. He is an author on 450 journal articles, 50 book chapters/editorials, over 250 abstracts, and 20 patent/disclosure applications. He has received numerous awards including the TR35 by the Technology Review Magazine, the Coulter Foundation Early Career, NSF Career, the Presidential Early Career Award for Scientists and Engineers.

