integrated biomimetic carbon nanotube composites for *in vivo* systems

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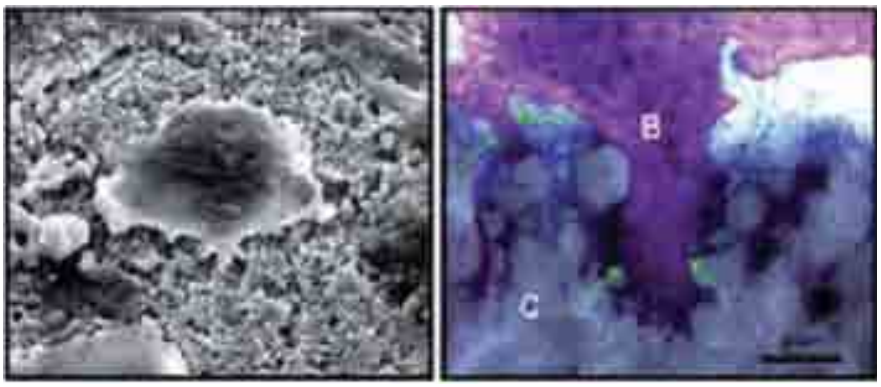
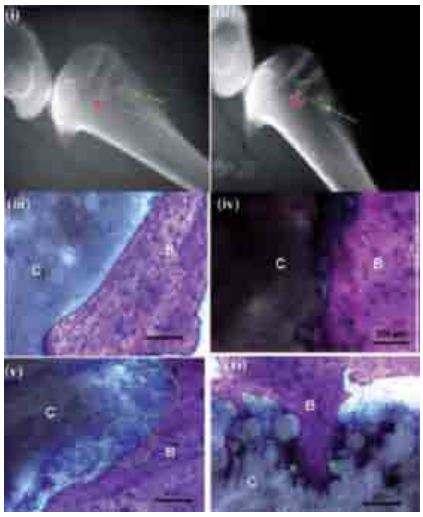


As interest in using carbon nanotubes for developing biologically compatible systems continues to grow, biological inspiration is stimulating new directions for *in vivo* approaches. The ability to integrate nanotechnology-based systems in the body will provide greater successes if the implanted material is made to mimic elements of the biological milieu especially through tuning physical and chemical characteristics. In this work, is demonstrated the highly successful capacity for *in vivo* implantation of a new carbon nanotube-based composite that is, itself, integrated with a hydroxyapatite-polymethyl methacrylate to create a nanocomposite. The success of this approach is grounded in finely tailoring the physical and chemical properties of this composite for the critical demands of biological integration. This is accomplished through controlling the surface modification scheme, which affects the interactions between carbon nanotubes and the hydroxyapatite-polymethyl methacrylate. Furthermore, carefully examination of cellular response with respect to adhesion and proliferation to examine in vitro compatibility



capacity is carried out. The results indicate that this new composite accelerates cell maturation through providing a mechanically competent bone matrix; this likely facilitates osteointegration *in vivo*. These results will have potential applications in a diversity of areas including carbon nanotube, regeneration, chemistry, and engineering research.