

Efficient drug carrier nanofibers contained PEG-POSS loading insulin nanoparticles for oral delivery of protein drugs

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In a recent year, nanotechnology has been utilized to develop new therapies and next generation nanosystems for “smart” drug delivery. A variety of organic/inorganic nanomaterials and devices have been often used as delivery vehicle to enhance the therapeutic activity by prolonging drug half-life, improving solubility of hydrophobic drugs, reducing potential immunogenicity, and/or releasing drugs in a sustained or stimuli-triggered fashion. Current treatment methods involve regular injections of insulin, which can be both painful and inconvenient, thus leading to low patient compliance. In order to overcome this problem, the oral route is considered to be the most convenient and comfortable means of drug administration for patients. In this work, novel drug carrier nanofibers with core-shell poly(ethylene glycol) (PEG)-polyhedral oligosilsesquioxane (POSS) nanoparticles were used to encapsulate insulin as new drug delivery carriers via electrospinning. The morphologies of fiber and particles, particle size and ζ potential of the pure nanostructured core-shell PEG-POSS and the corresponding insulin-loaded PEG-POSS nanoparticles were investigated by transmission electron microscopy (TEM) and laser diffraction particle sizer. Insulin release test showed that insulin was well-protected inside PEG-POSS nanoparticles at gastric pH for 2hrs, and was released at intestinal pH (pH 6-7) where the absorption and activation of the drug are necessary. We therefore believe that such nanofibers contained PEG-POSS nanoparticles could be useful as a potential carrier for insulin drug delivery systems.

Biography

Ms. Kyu Oh Kim have joined at department of Bioscience and Textile Technology, Nano Fusion Technology Research Group, Shinshu University at Japan, since 2009- now as a Doctor's degree (Advisor: Prof. Ick-Soo Kim). Her research interests are “Biocompatible Organic/inorganic nanofiber using a polyhedral oligosilsesquioxane (POSS) and designing the fibrous scaffolds for tissue engineering application”. She received her bachelor and master degree in polymer system engineering from Dankook University at Korea in 2009 (Advisor: Prof. Kee-JongYoon).