博 士 論 文 の 内 容 の 要 旨

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論文題目	Potential applications of advance functional polymeric nanofibers in biomedical and environmental engineering (優れた機能性を備えた高分子ナノファイバーの医療用・環境工学への応用の可能性に関する研究)

（博士論文の内容の要旨）

Nanomaterials plays the vital role in the main areas of advance research such as electronic, waste water treatment, detection and diagnose of various diseases, drug delivery, tissue engineering and nano medicine. Nanotechnology shows the different picture of materials. This thesis mainly focus on the biomedical applications like mask, wound dressing and antibacterial properties of nanomaterials using Electrospinning. For mask application, Copper oxide was selected as antibacterial agent due to its good antimicrobial properties as well as its production is economical as compared to other metallic nanoparticles which are being used as antibacterial agents i.e. Copper nanoparticles, gold nanoparticles, and silver nanoparticles. Presence of copper oxide nanoparticles exhibited excellent morphological, mechanical, structural, surface, and antimicrobial properties (samples having 1.00% CuO exhibited optimum results). Momordica charantia MC (bitter gourd) is a natural wound dressing for diabetic patients. Keeping in view valuable and fruitful properties of MC, we have loaded bitter gourd extract in combination with polyvinyl alcohol (PVA) on electrospinning and characterized for possible testing. It is expected that prepared composite nanofibers have potential applications as sustainable antibacterial wound dressings for smooth and speedy recovery of open wounds. Antibacterial property is very important for biomedical application. For this purpose silver sulfadiazine (AgSD) was loaded for the first time on electrospinning as well as self-synthesized AgSD on PAN nanofibers by solution immersion method and then compared the results of both. The antibacterial properties of PAN nanofibers impregnated with AgSD were determined with

both types of bacteria strains to compare with control one. Excellent antibacterial efficiency was indorsed to samples with AgSD by immersion method.

Cellulose is one of the most hydrophilic polymers with sufficient water holding capacity but it's unstable in aqueous conditions and it swells. Cellulose itself is not suitable for electrospun nanofibers' formation due to high swelling, viscosity, and lower conductivity. Carboxymethyl cellulose (CMC) is also super hydrophilic polymer, however it has same trend for nanofibers formation as that of cellulose. Due to above stated reasons, applications of CMC are quite limited in nanotechnology. Loading of CMC has been optimized for electrospun tri-component polyvinyl alcohol (PVA), polyvinylpyrrolidone (PVP), and carboxymethyl cellulose (CMC) nanofibers aiming widening its area of applications. It was observed that at weight ratio of PVP 12 and CMC 3 was as highest as possible loading to produce smooth nanofibers.