

ABSTRAK

PENGARUH TEGANGAN PADA PEMBENTUKAN SERAT NANO SILIKA DENGAN METODE *ELECTROSPINNING*

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Serat nano silika telah berhasil dibuat menggunakan metode *electrospinning*. Larutan silika/PVA disintesis dengan metode sol-gel. Larutan silika dibuat dengan perbandingan molar *tetraethyl orthosilicate* (TEOS): etanol: aquabides: *hydrogen chloride* (HCl) sebesar 1 : 10 : 3 : 0,04. *Polyvinyl alcohol* (PVA) 10% kemudian ditambah ke dalam larutan silika. Kedua larutan kemudian dicampur dengan perbandingan larutan silika : PVA sebesar 2 : 3. Gugus fungsi larutan silika/PVA dan PVA murni dikarakterisasi dengan *Fourier transform Infrared Spectroscopy* (FTIR). Morfologi permukaan dan analisis elemen diamati dengan *Scanning Electron Microscopy - Energy Dispersive Spectroscopy* (SEM - EDS). Gugus fungsi larutan silika/PVA yang terbentuk adalah -OH, C-H, CH₂, C=O, Si-O, dan Si-O-Si yang menunjukkan terjadinya ikatan silang antara silika dan PVA. Gugus fungsi yang ditunjukkan pada larutan masih tampak pada serat nano silika hasil *electrospinning* dengan adanya elemen C, O, dan Si pada hasil EDS serat nano silika. Tegangan *electrospinning* terbukti menunjukkan pengaruh terhadap pembentukan serat nano silika dilihat melalui morfologi permukaan serat. Morfologi permukaan menunjukkan serat nano silika semakin kontinu dan manik-manik relatif lebih berkurang seiring bertambahnya tegangan *electrospinning*. Estimasi standar deviasi pada grafik diameter rata-rata serat menunjukkan kecenderungan linier dan terjadi peningkatan seiring bertambahnya tegangan *electrospinning*. Serat nano silika yang dihasilkan memiliki rentang diameter 60 - 150 nm.

Kata kunci: Serat nano silika, *electrospinning*, tegangan *electrospinning*, TEOS, PVA.

ABSTRACT

THE INFLUENCE OF ELECTRICAL VOLTAGE ON FORMATION OF SILICA NANO FIBER WITH ELECTROSPINNING METHOD

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Silica nanofibers have been successfully fabricated using electrospinning method. Silica solution was prepared with molar ratio of tetraethyl orthosilicate (TEOS): ethanol: aquabides:hydrogen chloride (HCl) of 1 : 10 : 3 : 0.04. Polyvinyl alcohol (PVA) of 10% was added to solution. The solutions were then mixed with a ratio of silica: PVA solution of 2: 3. The functional group of silica/PVA was characterized by Fourier transform Infrared Spectroscopy (FTIR). Morphology and elements analysis was tested by Scanning Electron Microscopy - Energy Dispersive Spectroscopy (SEM - EDS). The functional groups of silica/PVA solution formed are -OH, C-H, CH₂, C=O, Si-O, and Si-O-Si which indicate the occurrence of cross-linking between silica and PVA. The functional groups shown in the solution are still visible on the silica nanofibers in the presence of C, O, and Si elements in the EDS results of the silica nano fibers. Electrospinning voltage is proven to have an effect on the formation of silica nanofibers seen through the surface morphology of the fiber. The surface morphology shows that the silica nanofibers are more continuous and the beads are relatively less with increasing electrospinning voltage. The estimated standard deviation of the average fiber diameter shows a linear trend and the fibers diameter increases with increasing applied electrospinning voltage. Silica nanofibers with diameter range 60 - 150 nm are obtained.

Keywords: *Silica nanofibers, electrospinning, electrospinning voltage, TEOS, PVA*