

INTISARI

PENGARUH MORFOLOGI BENANG NANOFIBER HASIL *TWISTING* MEMBRAN *POLYACRYLONITRILE* TERHADAP SIFAT MEKANIKNYA

Oleh

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Pada penelitian ini, benang nanofiber dibuat dari membran *polyacrylonitrile* (PAN) menggunakan metode elektrospinning dan *twisting*. Polimer PAN dilarutkan ke dalam *N,N dimethylformamide* (DMF) dengan konsentrasi 6 wt% hingga homogen. Pengaruh morfologi terhadap sifat mekanik benang diamati. Jumlah *twist* yang diberikan pada masing-masing benang adalah 10, 20, 30, dan 40 kali. Melalui *scanning electron microscopy* (SEM) diamati penampang lintang benang dan diketahui bahwa jumlah *twist* berpengaruh terhadap kepadatan benang. *Universal testing machine* (UTM) digunakan untuk mengetahui sifat mekanik benang. Kekuatan benang ditunjukkan dari nilai kuat tarik, keuletan benang ditunjukkan dari nilai regangan, dan kekakuan benang ditunjukkan dari nilai modulus elastisitas. Kuat tarik benang PAN 10, PAN 20, PAN 30, dan PAN 40 masing-masing yaitu 6,44 MPa, 5,72 MPa, 6,13 MPa, dan 6,77 MPa. Regangan masing-masing benang adalah 29,03%, 25,99%, 17,39%, dan 25,47%. Modulus elastisitas masing-masing benang adalah 22,17 MPa, 22,00 MPa, 35,22 MPa, dan 26,57 MPa. Berdasarkan hasil penelitian, benang PAN 10, PAN 20, dan PAN 40 memiliki sifat mekanik yang sama yaitu rapuh namun liat, sedangkan benang PAN 30 memiliki sifat rapuh dan getas sehingga disimpulkan bahwa morfologi tidak berpengaruh secara signifikan terhadap sifat mekanik benang hasil *twisting* membran PAN.

Kata kunci : benang, *polyacrylonitrile*, elektrospinning, *twisting*, uji tarik

ABSTRACT

THE EFFECT OF MORPHOLOGY OF NANOFIBER YARN FABRICATED FROM TWISTED POLYACRYLONITRILE MEMBRANE ON MECHANICAL PROPERTIES

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In this study, nanofiber yarn was made from polyacrylonitrile (PAN) membrane using electrospinning and twisting methods. PAN polymers were dissolved into N,N dimethylformamide (DMF) at a concentration of 6 wt%. The influence of morphology on the mechanical properties of yarn was observed. The number of twist given to each yarn is 10, 20, 30, and 40 times. Through scanning electron microscopy (SEM), a cross section of yarn is observed and it is known that the number of twist affects the yarn density. Universal testing machine (UTM) is used to determine the mechanical properties of yarn. The strength of yarn is shown from the tensile strength value, the ductility of yarn is shown from the value of strain, and the yarn stiffness is shown from the modulus of elasticity. The tensile strength of PAN 10, PAN 20, PAN 30 and PAN 40 yarns are 6,44 MPa, 5,72 MPa, 6,13 MPa and 6,77 MPa respectively. The ductility of each yarn is 29,03%, 25,99%, 17,39%, and 25,47%. The modulus of elasticity of each yarn is 22,17 MPa, 22,00 MPa, 35,22 MPa, and 26,57 MPa. Based on the results of study, PAN 10, PAN 20, and PAN 40 yarns have the same mechanical properties that are brittle but ductile, while PAN 30 yarn has brittle properties so it is concluded that morphology does not significantly influence the mechanical properties of yarn fabricated from twisted PAN membrane.

Keywords : yarn, polyacrylonitrile, electrospinning, twisting, tensile test