



INTISARI

NANOFIBER ALGINAT/POLI(VINIL ALKOHOL) (PVA) UNTUK ADSORPSI CO₂

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Telah dilakukan sintesis nanofiber Alg/PVA dengan teknik elektrospinning. Penelitian ini bertujuan mensintesis nanofiber Alg/PVA untuk adsorpsi gas CO₂. Nanofiber Alg/PVA disintesis dari larutan alginat 2% (b/b) dan larutan PVA 10% (b/b). Larutan Alg/PVA dielektrospinning membentuk nanofiber pada kondisi tegangan arus 15 kV, TTCD (*Tip-to-Collector Distance*) 15 cm dan diameter *spinneret* 0,5 mm (25 gauge). Larutan Alg/PVA divariasikan rasio volume larutan Alg/PVA 0/10, 1/9, 2/8, 3/7 dan 4/6 untuk mengetahui pengaruh rasio volume terhadap morfologi nanofiber. Nanofiber Alg/PVA dielektrospinning 1-5 jam untuk mendapatkan nanofiber dengan berbagai variasi *basis weight* (i.e. massa). Nanofiber Alg/PVA dikarakterisasi menggunakan *Fourier Transform Infrared Spectroscopy* (FTIR), *Scanning Electron Microscope* (SEM), *Texture Analyzer* dan *Surface Area & Pore Size Analyzer*.

Morfologi nanofiber Alg/PVA paling optimal diperoleh dari rasio volume larutan 2/8 dengan diameter 202 ± 43 nm memiliki luas permukaan (S_{BET}) sebesar $9,197 \text{ m}^2/\text{g}$. Kapasitas adsorpsi CO₂ nanofiber Alg/PVA dianalisis menggunakan *gas trap system*. Kapasitas adsorpsi diukur pada kondisi tekanan 1 atm dan temperatur 298 K. Nanofiber Alg/PVA rasio volume 2/8 mampu mengadsorpsi gas CO₂ sebanyak 3,286 mmol/g. Peningkatan *basis weight* turut meningkatkan kapasitas adsorpsi nanofiber Alg/PVA. Kapasitas adsorpsi paling optimal diperoleh dari nanofiber Alg/PVA rasio volume 2/8 dengan *basis weight* 4955 g/m² sebesar 4,548 mmol/g. Nanofiber Alg/PVA berpotensi dijadikan material baru untuk adsorpsi gas CO₂ dengan kapasitas adsorpsi yang relatif besar, murah dan ramah lingkungan serta berpotensi untuk digunakan kembali (*recycle*).

Kata kunci: elektrospinning, nanofiber, Alginat/PVA, adsorpsi CO₂, *gas trap system*.



ABSTRACT

NANOFIBERS ALGINATE/POLY(VINYL ALCOHOL) (PVA) FOR CO₂ ADSORPTION

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Synthesis of nanofibers Alg/PVA for CO₂ adsorption by electrospinning technique has been carried out. Nanofibers Alg/PVA made by alginate solution 2% (w/w) and PVA solution 10% (w/w) with volume ratios solution Alg/PVA 0/10, 1/9, 2/8, 3/7 and 4/6. The polymer solution Alg/PVA was placed in a 10 cc syringe with a 25 gauge needle, the applied voltage was 15 kV and TTCD (Tip-to-Collector Distance) was 15 cm. Nanofibers Alg/PVA electrospun for 1 - 5 hour to obtain basis weight (i.e. mass) variation. Nanofibers was characterized by FTIR, SEM, Texture Analyzer and Surface Area & Pore Size Analyzer.

The SEM image showed that the smoothest and finest nanofibers was obtained from Alg/PVA volume ratios 2/8 with average diameter 202 ± 43 nm. Alg/PVA nanofibers has spesifik surface area (S_{BET}) 9,197 m²/g. Adsorption capacity of nanofibers Alg/PVA was analyzed by ownmade gas trap system measured at 1 atm and 298 K. Adsorption capacity of nanofibers Alg/PVA volume ratios 2/8 up to 3,286 mmol/g. Adsorption capacity can be optimized by increasing basis weight. Optimal adsorption capacity obtained from nanofibers Alg/PVA volume ratios 2/8 basis weight 4955 g/m² with CO₂ uptake up to 4,548 mmol/g. Nanofibers Alg/PVA perform high adsorption capacity, which offers new eco-friendly materials with great potentials for CO₂ capture and storage, also potentials to be recycled.

Keywords: electrospinning, nanofiber, alginate/PVA, CO₂ adsorption, gas trap system.