

## INTISARI

### FABRIKASI DAN KARAKTERISASI NANOKOMPOSIT POLIVINIL ALKOHOL (PVA) DENGAN PENGISI SELULOSA NANOKRISTALIN DARI LIMBAH RAMI (*Boehmeria nivea* (L.) Gaud)

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Fabrikasi dan karakterisasi nanokomposit *polyvinyl alcohol* (PVA) dengan pengisi selulosa nanokristalin dari limbah rami telah dilakukan. *Polyvinyl alcohol* (PVA) sebagai matriks dan nanokomposit dari *cellulose nanocrystalline* (CNC) sebagai bahan pengisi. CNC limbah rami diperoleh melalui proses alkalisasi, pengelantangan (*bleaching*) dan hidrolisis asam. Pada proses alkalisasi dilakukan perendaman pada larutan 6% NaOH selama 3 jam pada suhu 80 °C dengan tiga kali pengulangan. Selanjutnya dilakukan proses pengelantangan menggunakan larutan 5% (v/v) NaClO<sub>2</sub> ditambah larutan *buffer asetat* selama 2 jam pada suhu 70 °C, kemudian hidrolisis asam menggunakan H<sub>2</sub>SO<sub>4</sub> 30% (b/v) dipanaskan selama 1 jam dengan suhu 45 °C dan sonikasi selama 1 jam. Pembuatan dan karakterisasi nanokomposit dilakukan dengan metode *film casting* menggunakan 10% PVA dan penambahan *filler* CNC rami dengan variasi sebanyak 8 varian yakni (PCNC 0-PCNC 6%). Sifat fisik, struktur, termal dan kekuatan tarik dikarakterisasi menggunakan TEM, SEM, FTIR, XRD, DSC, *Uv-Vis* dan UTM. Pengujian FTIR menunjukkan gugus O-H (*stretching*), C-H (*stretching*), dan C-O (*stretching*). Morfologi sebelum dan sesudah proses kimia diamati melalui TEM dan SEM diperoleh diameter rata-rata 4,52 ± 0,468 nm. Nilai *opacity* yang diperoleh 48,6 AUnm-138,8 AUnm; temperatur titik leleh 227,92 °C-226,09 °C; temperatur degradasi 338,07 °C-349,97 °C; temperatur transisi gelas 70,50 °C-76,54 °C. Nilai kuat tarik nanokomposit yaitu 21,75 ± 2,03 MPa sampai 48,78 ± 11,15 MPa. Nilai regangan nanokomposit sebesar 52,55 ± 5,30 sampai 89,88 ± 21,83.

**Kata kunci:** rami, polivinil alkohol, selulosa nanokristalin, nanokomposit.

## ABSTRACT

### FABRICATION AND CHARACTERIZATION OF POLIVINYL ALCOHOL (PVA) NANOCOMPOSITES WITH CELLULOSE NANOCRYSTALLINE OF RAMIE (*Boehmeria nivea* (L.) Gaud)

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Fabrication and characterization of polyvinyl alcohol (PVA) nanocomposite with nanocrystalline cellulose as filler from ramie has been finished. Polyvinyl alcohol (PVA) as a matrix and nanocomposite from cellulose nanocrystalline (CNC) as filler has been characterized. CNC ramie is obtained through the process of alkalization, bleaching and acid hydrolysis. In the alkalization process, immersion in a 6% NaOH solution for 3 hours at a temperature of 80 °C with three repetitions. The bleaching process was then carried out using a 5% (v/v) NaClO<sub>2</sub> solution plus acetate buffer solution for 2 hours at 70 °C, then acid hydrolysis using 30% (w/v) H<sub>2</sub>SO<sub>4</sub> heated for 1 hour at 45 °C and sonication for 1 hour. The manufacture and characterization of nanocomposites was carried out using the film casting method using 10% PVA and the addition of hemp CNC filler with a variation of 8 variants, namely (PCNC 0-PCNC 6%). Physical, structural, thermal and tensile strength properties were characterized using TEM, SEM, FTIR, XRD, DSC, Uv-Vis and UTM. The FTIR test shows the O-H (stretching), C-H (stretching), and C-O (stretching) groups. The morphology before and after the chemical process was observed through TEM and SEM obtained an average diameter of  $4.52 \pm 0.0468$  nm. The opacity value obtained is 48.6 AUnm-138.8 AUnm; melting point temperature 227.92 °C-226.09 °C; degradation temperature 338.97 °C-349.97 °C; glass transition temperature 70,50 °C-76,54 °C. The tensile strength of the nanocomposite was  $21.75 \pm 2.03$  MPa to  $8.78 \pm 11.15$  MPa. The strain value of the nanocomposite was  $52.55 \pm 5.30$  to  $89.88 \pm 21.83$ .

**Keywords:** ramie, polyvinyl alcohol, cellulose nanocrystalline, nanocomposite.