Pengaruh konsentrasi doping asam asetat terhadap sifat dielektrik polianilin = Effect of doping concentration of acetic acid to dielectric properties of polyaniline

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Abstrak

Pada penelitian ini, telah dilakukan sintesis PANi konduktif melalui serangkaian proses terdiri dari reaksi oksidatif kimiawi untuk melangsungkan proses polimerisasi selama 8 jam dengan hasil berupa PANi Emeraldin (PANi-ES). Tahapan proses sintesis PANi-ES ini diikuti dengan tahapan deprotonisasi untuk membentuk PANi basa atau PANi emeraldin-base (PANi-EB). Tahapan sintesis akhir adalah berupa tahapan untuk menimbulkan sifat konduktifitas listrik PANi melalui doping asam lemah CH3COOH dengan cara mencampurkan PANi-EB sebanyak 8 gram kedalam 40-160 ml larutan asam asetat. Proses pengeringan PANi melaui metode pengeringan vakum mengambil waktu 1 minggu. Selama proses polimerisasi berlangsung dilakukan pengukuran temperatur larutan, perubahan pH dan viskositas serta ukuran rata-rata partikel PANi. Keberhasilan sintesis Pani konduktif diindikasikan oleh spektrum FTIR dan pengukuran nilai konduktifitas listriknya. Hasil evaluasi kedua indikator tersebut menujukkan bahwa semua PANI yang telah didoping memiliki puncak karakteristik transmisi IR antara lain pada angka gelombang 3000, 1500, 1400, 1300 dan 800 cm-1. Sedangkan konduktifitas listrik yang diperoleh dari PANi-EB sebesar 0,18 S/cm meningkat drastis menjadi 459, 955, 1158 dan 864 S/cm setelah didoping dengan asam lemah CH3COOH dengan ratio antara PANi dan asam berturut-turut adalah 1:5; 1:10; 1:15 dan 1:20. PANi hasil sintesis melalui proses polimerisasi dan doping asam lemah ini bersifat dielektrik dengan nilai permitivitas listriknya adalah '= 0.01 18 dan "=0.01 17 dalam rentang frekuensi 8-12 GHz. Sebagai konsekuensi sifat dielektrik, PANi hasil sintesis memiliki kemampuan menyerap gelombang elektromagnetik, meskipun pada jangkau frekuensi pengujian, nilai Reflection Loss (RL) yang baik diperoleh pada PANi dengan nilai konduktifitas yang rendah.

.....In this study, conductive PANi has been synthesized through a series of chemical oxidative reactions to carry out the polymerization process for 8 hours, which resulted in a PANi Emeraldin (PANi-ES). The synthesize processes of PANi-ES were followed by de-protonisation stage to form emeraldin-base PANi (PANi-EB). The final stage of conductive PANi was a protonisation stage to generate the electrical conductivity in synthesized PANi. This physical property was obtained through doping treatment by mixing between PANi-EB of 8 grams in mass and 40-160 ml of weak acid CH3COOH solution. The drying process of conductive PANi was carried out through a vacuum drying method which required at least 1 week duration. During the polymerization process taking place, the temperature, a change in pH and viscosity as well as the average size of the particles of solution were measured. The success of the synthesis of conductive Pani was indicated by FTIR spectrum and their respective electrical conductivity values. Results of evaluation for both indicators showed that all doped PANI have an infra-red spectrum characteristic of PANi indicated by absorptions at wave numbers 3000, 1500, 1400, 1300 dan 800cm-1. Whereas the electrical conductivity value obtained from PANi-EB was 0,18 S/cm. This value was increased dramatically to 459; 955, 1158 and 864 S/cm after doped by a weak acid CH3COOH with the ratio between PANi and acid, respectively is 1: 5; 1:10; 1:15 and 1:20. Hence, the synthesized PANi through polymerization and

doping with the weak acid solution has resulted in the dielectric materials with a typical of the electric permittivity value '= 0.01 18 and "=0.01 17 in the frequency range of 8-12 GHz. Consequently, the Synthesized PANi has the ability to absorb electromagnetic waves, though the value of Reflection Loss (RL) which obtained in current frequency low was relatively low.