KARAKTERISASI DAN UJI STABILITAS SINTESIS *POLYDIMETHYLSILOXANE* (PDMS) TERHADAP PAPARAN RADIASI SINAR ULTRAVIOLET (UV)

SKRIPSI

diajukan untuk memenuhi syarat dalam memperoleh gelar Sarjana Sains

Program Studi Fisika Departemen Pendidikan Fisika

Kelompok Bidang Kajian Fisika Material

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Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar

Sarjana Sains pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

LEMBAR PENGESAHAN

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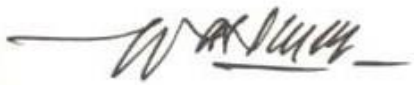

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ABSTRAK

Polydimethylsiloxane (PDMS) adalah polimer yang sering digunakan sebagai pengganti *vitreous humour* pada bedah *vitreoretinal* karena memiliki beberapa karakteristik seperti tidak bereaksi dengan zat lain secara kimia, transparan, hidrofobik, tidak menyerap zat lain, dan pada rentang cahaya tampak memiliki nilai transmitansi mencapai 100%. Dalam penelitian ini sintesis, karakterisasi, dan uji stabilitas PDMS terhadap paparan radiasi sinar UV dengan intensitas 1.82 mW/cm^2 selama 15 menit telah dilakukan. PDMS disintesis dengan menggunakan metode polimerisasi pembukaan cincin dengan mencampurkan *octamethylcyclotetrasiloxane* (D4) sebagai monomer siklik dengan *hexamethyldisiloxane* (MM) sebagai rantai terminator dan Kalium Hidroksida (KOH) sebagai katalis. Berdasarkan data hasil karakterisasi dan uji stabilitas dengan menggunakan spektrofotometer UV-Vis ditemukan bahwa nilai transmitansi pada seluruh sampel cenderung mengalami penurunan ketika dipaparkan terhadap radiasi sinar UV. Nilai viskositas yang dikarakterisasi dan di uji stabilitasnya dengan menggunakan viskometer cenderung meningkat seiring dengan dikenainya paparan secara berulang namun pada PDMS-A dan PDMS-B viskositas relatif stabil. Hasil karakterisasi dan uji stabilitas tegangan permukaan dengan menggunakan tensiometer menunjukkan bahwa pada sebagian besar paparan PDMS relatif stabil dengan rentang nilai 19 mN/m hingga 22 mN/m. Indeks bias PDMS yang dikarakterisasi dan diuji stabilitasnya dengan menggunakan refraktometer mengalami penurunan yang relatif kecil seiring dengan dikenainya paparan secara berulang. Hasil karakterisasi dengan menggunakan spektrofotometer FT-IR memperlihatkan bahwa PDMS memiliki gugus fungsi yang mirip dengan PDMS komersial 1300 cSt. Beberapa keadaan pada karakteristik fisis PDMS setelah dikenai paparan radiasi sinar UV ditemukan kurang stabil namun sebagian besar masih berada pada rentang karakteristik PDMS komersial.

Kata Kunci : *Polydimethylsiloxane* (PDMS), *Vitreous Humor*, Polimerisasi Pembukaan Cincin, Paparan Sinar UV.

CHARACTERIZATION AND STABILITY TESTING OF *POLYDIMETHYLSILOXANE* (PDMS) ON EXPOSURE OF ULTRAVIOLET (UV) RADIATION

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ABSTRACT

Polydimethylsiloxane (PDMS) is a polymer that is often used as a substitute for vitreous humor in vitreoretinal surgery because it has several characteristics such as not reacting with other substances chemically, being transparent, hydrophobic, not absorbing other substances, and in the visible light range having a transmittance value of up to 100%. In this study the synthesis, characterization, and stability test of PDMS against exposure to UV radiation with an intensity of 1.82 mW/cm^2 for 15 minutes was carried out. PDMS was synthesized using the ring-opening polymerization method by mixing *octamethylcyclotetrasiloxane* (D4) as a cyclic monomer with *hexamethyldisiloxane* (MM) as a chain terminator and potassium hydroxide (KOH) as a catalyst. Based on the data from the characterization and stability test using a UV-Vis spectrophotometer, it was found that the transmittance value of all samples tended to decrease when exposed to UV radiation. The value of viscosity characterized and tested for stability using a viscometer tends to increase with repeated exposure, but in PDMS-A and PDMS-B the viscosity is relatively stable. The results of characterization and surface tension stability test using a tensiometer showed that in most exposures PDMS was relatively stable with a value range of 19 mN/m to 22 mN/m. The refractive index of PDMS which was characterized and tested for stability using a refractometer experienced a relatively small decrease with repeated exposure. The results of characterization using FT-IR spectrophotometer showed that PDMS has a functional group similar to commercial PDMS 1300 cSt. Several conditions on the physical characteristics of PDMS after exposure to UV radiation were found to be less stable but most of them were still in the range of commercial PDMS characteristics.

Keywords : *Polydimethylsiloxane* (PDMS), *Vitreous Humor*, Ring Opening Polymerization, UV Exposure.

DAFTAR ISI

DAFTAR GAMBAR

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