

ABSTRAK

Hariono, NIM 4172240005 (2021). Preparasi, Sifat Struktur Dan Optik Ion Neodymium Oxide (Nd₂O₃) Di Doping Pada Sistem Gelas Fosfat (P₂O₅)

Telah berhasil dilakukan pembentukan medium gelas penguat optik dari komposisi senyawa komposisi senyawa $60\text{P}_2\text{O}_5 - 20\text{Na}_2\text{O} - 10\text{CaF}_2 - 10\text{Li}_2\text{O} - x\text{Nd}_2\text{O}_3$ dengan kemurnian di atas 99% dimana $x = 0.5; 1.0; 1.5; 2.0$ (%mol) yang didoping oleh ion aktif Nd₂O₃. Semua senyawa kimia berbentuk serbuk dengan total massa yang dicampur kedalam wadah *Crucible Porcelain* sebanyak 15 gram dengan menggunakan teknik *melt-quenching* pada suhu 1000°C. Untuk mengetahui kualitas dari material gelas, maka dilakukan pengukuran dan perhitungan terhadap sifat fisis gelas antara lain massa molar, kerapatan, konsentrasi ion Nd³⁺, polaron radius, kekuatan medan, indeks bias, refraktivitas molar, suseptibilitas, reflection loss, dan konstanta dielektrik. Karakterisasi yang dilakukan menggunakan XRD, FTIR, UV-vis-NIR, Abbe Refraktometer, dan Spektrofluorophotometer. Hasil XRD menunjukkan struktur gelas dengan dopingan Nd³⁺ yang dibuat adalah amorf. Kerapatan sampel juga meningkat secara perlahan mengikuti kenaikan konsentrasi ion Nd³⁺. Material gelas Nd³⁺ menghasilkan dua transisi pita emisi yaitu ${}^4\text{F}_{3/2} \rightarrow {}^4\text{I}_{11/2}$ dan ${}^4\text{F}_{3/2} \rightarrow {}^4\text{I}_{13/2}$ secara konsisten dan dapat dihasilkan oleh setiap gelas pada panjang gelombang 1062 dan 1335 nm.

Kata Kunci : *Medium gelas, ion Nd³⁺, didoping, sifat fisis, karakterisasi, Melt-quenching.*

ABSTRACT

Hariono, NIM 4172240005 (2021). Preparation, Structural and Optical Properties of Neodymium Oxide (Nd_2O_3) Doping In Phosphate Glass System (P_2O_5)

The formation of optical reinforcing glass medium has been successfully carried out from the composition of the compound composition $60\text{P}_2\text{O}_5 - 20\text{Na}_2\text{O} - 10\text{CaF}_2 - 10\text{Li}_2\text{O} - x\text{Nd}_2\text{O}_3$ with a purity above 99% where $x = 0.5; 1.0; 1.5; 2.0$ (%mol) doped by the active ion Nd_2O_3 . All chemical compounds were in powder form with a total mass of 15 grams mixed into a crucible porcelain container using the melt-quenching technique at a temperature of 1000°C . To determine the quality of the glass material, measurements and calculations were made on the physical properties of the glass, including molar mass, density, Nd^{3+} ion concentration, polaron radius, field strength, refractive index, molar refractivity, susceptibility, reflection loss, and dielectric constant. Characterization was carried out using XRD, FTIR, UV-vis-NIR, Abbe Refractometer, and Spectrofluorophotometer. The XRD results showed that the glass structure with Nd^{3+} doped was amorphous. The density of the sample also increases slowly following the increase in the concentration of Nd^{3+} ions. Nd^{3+} glass material produces two emission band transitions, namely ${}^4\text{F}_{3/2} \rightarrow {}^4\text{I}_{11/2}$ and ${}^4\text{F}_{3/2} \rightarrow {}^4\text{I}_{13/2}$ consistently and can be produced by each glass at wavelengths of 1062 and 1335 nm.

Keyword: *Glass medium, Nd^{3+} ions, doped, physical properties, characterization, Melt-quenching.*

