

Wildanatus Tsaniyah, 2020. **Sensor Serat Optik Berstruktur *Singlemode-Multimode-Singlemode* (SMS) untuk Mendeteksi Ion Kadmium dalam Air**. Skripsi ini di bawah bimbingan Samian, S. Si dan Drs. Pujiyanto, M.S., Program Studi Fisika, Departemen Fisika, Fakultas Sains dan Teknologi, Universitas Airlangga.

ABSTRAK

Deteksi ion kadmium dalam air dilakukan menggunakan serat optik berstruktur SMS sebagai sensor. *Set up* alat yang digunakan dalam penelitian ini antara lain, ASE (*Amplified Spontaneous Emission*) pada rentang panjang gelombang 1510 nm – 1550 nm sebagai sumber cahaya, serat optik berstruktur SMS (*Singlemode-Multimode-Singlemode*), serat optik berstruktur SMS *coreless* (*Singlemode-Multimode Coreless-Singlemode*), larutan kadmium (CdCl_2) dengan berbagai konsentrasi, dan OSA (*Optical Spectrum Analyzer*). Mekanisme deteksi memanfaatkan perubahan medium (larutan CdCl_2) di sekitar *multimode* serat optik berstruktur SMS sebagai *cladding*. Perubahan indeks bias larutan CdCl_2 di sekitar *multimode* serat optik berstruktur SMS menyebabkan perubahan spektrum hasil interferensi yang dideteksi dalam bentuk perubahan daya puncak dan panjang gelombang puncak cahaya melalui serat optik berstruktur SMS. Hasil penelitian menunjukkan perubahan daya transmisi puncak dan panjang gelombang puncak konsisten. Jangkauan sensor ini adalah 5 ppm – 30 ppm. Daerah linier, sensitivitas, dan resolusi untuk probe sensor SMS Normal masing-masing sebesar 10 ppm – 30 ppm, 0,0066 dBm/ppm, dan 0,076 ppm. Sedangkan untuk sensor serat optik berstruktur SMS *Coreless* diperoleh daerah linier, sensitivitas, dan resolusi masing-masing sebesar 5 ppm – 30 ppm, 0,0111 nm/ppm, dan 0,451 ppm.

Kata Kunci: Ion kadmium, serat optik berstruktur SMS, pembiasan, sensor konsentrasi.

Wildanatus Tsaniyah, 2020. *Singlemode-Multimode-Singlemode (SMS) Fiber Structure Sensor for Cadmium Ions Detection*. This undergraduatedthesis is supervised by Samian, S. Si dan Drs. Pujiyanto, M.S., Physics Department, Faculty of Science and Technology, Airlangga University.

ABSTRACT

Detection of cadmium ions in the water has been done using SMS fiber structure as sensor. Instruments that has been used for this research are, ASE (Amplified Spontaneous Emission) in the wavelength range between 1510 nm – 1550 nm, optical fiber that has SMS fiber (Singlemode-Multimode-Singlemode) structure, optical fiber that has SMS coreless fiber (Singlemode-Multimode Coreless-Singlemode) structure, cadmium solution (CdCl_2) with various concentration, and OSA (Optical Spectrum Analyzer). This research uses the change of medium (CdCl_2 solution) around multimode section of SMS fiber structure as cladding. The change in refractive index of CdCl_2 solution induces a change of interference result spectrum which detected in form of the peak power change and the change of peak wavelength that has been passed out through SMS fiber structure. The result is consistent change of peak power and peak wavelength that has been passed out through the SMS fiber structure. The range of this sensor is 5 ppm-30 ppm. Linear range, sensitivity, and resolution of SMS Normal fiber structure sensor are 10 ppm – 30 ppm, 0,0066 dBm/ppm, dan 0,076 ppm. Linear range, sensitivity, and resolution of SMS *Coreless* fiber structure sensor are 5 ppm – 30 ppm, 0,0111 nm/ppm, dan 0,451 ppm.

Keyword: Cadmium ions, SMS fiber structure, refraction, concentration sensor.