

Aris Kurniawan, 2007. **Establishment and Characterization of X-Ray Detector System with Based on Photodiode.** Under guidance of Khusnul Ain, ST, M.Si. and Imam Sapuan, S.Si, M.Si.. Department of Physics, Faculty of Mathematics and Natural Sciences, Airlangga University.

ABSTRACT

The research had purpose to realize an *x-ray detector system* by use *photodiode* which available on domestic markets. Moreover, the research was purposed to compare the result of *x-ray spectroscopy* by use the made detector system concerning to the NaI(Tl) detector system.

The constructor components of made detector system could be divided onto two main units, they were detector units and pulse-shaping amplifier units. The detector units were sensor and converter, which had taken action by *photodiode*, *fluorescence paper* to goal the *scintillation* process, and electronic circuits of charge-sensitive preamplifier. The pulse-shaping amplifier units were CR-RC² electronic circuits of differentiator and active integrator.

The made detector system had electronic noise value of $(8\pm 0,1)$ mV. The test to know the work quality of the made detector system concerning to the NaI(Tl) detector system has done by applied both of detector system on *x-ray spectroscopy*. *Energy resolution* values of both detector systems were obtained as one result of analysis to energy spectrum. The *energy resolution* values of the made detector system and NaI(Tl) detector system on x-ray set 20 kVP – 8 mA were 30,12% and 64,29%, respectively.

The research results indicated that the made detector system for x-ray detection has been realized with based on *photodiode*. The result of this establishment of x-ray *scintillation* detector system with based on *photodiode* had *energy dispersion* characteristic, i.e. that the detector system able to give appropriate response on energy of x-ray which impinges on it. This characteristic caused the detector system to had opportunity to applied widely more than as x-ray counter system.

Key Word: *x-ray detector, photodiode, x-ray spectroscopy, fluorescence, scintillation, detector resolution.*