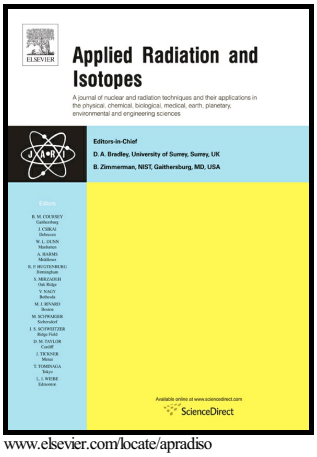

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Effect of charge on the current-voltage characteristics of silicon pin structures with and without getter annealing under beta irradiation of Ni-63

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Abstract

The charge model for efficiency of betavoltaics effect is proposed. It allows calculating the charge value for pin structures under irradiation of Ni-63. We approximated the current-voltage characteristics of the structures using an equivalent diode circuit with a charge on the barrier capacitance. We calculated the charge function from current-voltage characteristics for two types of silicon pin structures - with and without getter annealing. The charging on the surface of pin structure decreases the efficiency of betavoltaics effect. Value of charge for our structures is changed in the range from -50 to +15 mC/cm^2 and depends on the applied potential. The getter annealing allows getting the structures with a higher efficiency of betavoltaic effect, but it does not exclude the surface charging under beta irradiation from Ni-63.

Keywords: charge model, betavoltaic structure, silicon diode, betavoltaics effect, current-voltage characteristic, Ni-63

1. Introduction

The miniaturization of semiconductor circuits and the development of microelectromechanical systems has led to a decrease in energy consumption.

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