

## **Influence of thermal processing and 10 Mev electron beam on the crystallinity of polyethylene**

**G. Mirjalili<sup>1</sup>, M. Borhani Zarandi<sup>1,2,\*</sup>, F. Ziaei<sup>3</sup>, M. A. Bolorizadeh<sup>2</sup>**

*1- physics Department, Yazd University, Yazd, Iran*

*2- physics Department, shahid bahonar University, kerman, Iran*

*3-Material and Ion Beam Application Division, Nuclear Research Center for Agriculture and Medicine*

(Received: 17/2/2007, in revised form: 23/10/2007)

**Abstract:** Samples from two type of polyethylene, with low and high density, had been subjected to three different initial processing. The samples were heated to 170 °C and then cooled by different cooling rating in air, in mold (10 °C/min cooling rate) and in 0.0 °C water. Following this step, each sample irradiated by 10 MeV electron beam. The gel content of the samples, which is a measure of interchain cross links formed on the amorphous area of the polymer, is a created due to electron impactation and was extracted into the xylene. Change in crystallinity of the samples was monitored by differential scanning calorimetry (DSC) technique. It has been shown that increase of the radiation dose up to 200 KGy, increases to the gel content of the polymer samples, but in higher doses remains without considerable change. Crystallinity of the polymer samples depends on the heat treatment and also radiation dose. Cooling rate has significant effect on crystallinity, so the more cooling rate the crystalline content of the polymer more reduces. However, Cystallinity of the polymer samples due to the absorption of radiation up to 200 KGy increases and then with increase of radiation dose decreases. Our study showed that change in crystallinity of the LDPE due to the absorption of the radiation is more than that of HDPE.

**Keywords:** *Polyethylene, Crystallinity, Electron beam, Differential scanning calorimetry (DSC).*