

Electron beam irradiation effects on polyacrylonitrile fiberClaudia Giovedi¹, Clarissa P. Zelinschi de Arruda¹, Ana Cláudia V. Carolino¹, Eddy S. Pino², Luci D.B. Machado²¹ Centro Tecnológico da Marinha em São Paulo (CTMSP), Av. Professor Lineu Prestes 2268, 05508-900 São Paulo, SP
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Carbon fibers are used in a wide variety of applications, such as in the automobile and aeronautic industry, manufacture of sport products and medical instruments. Nowadays about 90% of available carbon fibers are processed from polyacrylonitrile (PAN) based precursors. This process requires a PAN oxidative stabilization step and thereafter a carbonization step in inert atmosphere. The conventional way to produce carbon fiber from a PAN fiber is a thermal process, but the literature also mentions the use of ionizing irradiation as an effective procedure to improve the characteristics of the carbon fiber obtained at the end of the process. The aim of this paper was to evaluate the changes induced by different doses of electron beam irradiation on PAN fibers used as precursor to produce carbon fiber. The experiments were carried out with a commercial PAN fiber. The electron beam irradiation doses applied were: 200, 400, 600 and 800 kGy. The effects induced on the PAN fiber were evaluated by termogravimetry (TG), differential scanning calorimetry (DSC) and Fourier transform infrared spectroscopy (FTIR). The results obtained showed that the electron beam irradiation induces significant changes in PAN fibers, resulting in a different thermal behavior and the formation of new functional groups. Irradiated samples presented a DSC double peak compared to the single peak observed for the non-irradiated sample. These results show that electron beam irradiation can play an important role, in the future, in the production process of carbon fiber from PAN precursors.