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Electron beam induced enhancement of the catalytic properties of ion-track membranes supported copper nanotubes in the reaction of the P-nitrophenol reduction([Article](#))([Открытый доступ](#))

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This study considers the effect of various doses of electron irradiation on the crystal structure and properties of composite catalysts based on polyethylene terephthalate track-etched membranes and copper nanotubes. Copper nanotubes were obtained by electroless template synthesis and irradiated with electrons with 3.8 MeV energy in the dose range of 100–250 kGy in increments of 50 kGy. The original and irradiated samples of composites were investigated by X-ray diffraction technique (XRD), scanning electron microscopy (SEM) and atomic force microscopy (AFM). The improved catalytic activity of composite membranes with copper nanotubes was demonstrated by the example of the reduction reaction of p-nitrophenol in the presence of sodium borohydride. Irradiation with electrons at doses of 100 and 150 kGy led to reaction rate constant increases by 35 and 59%, respectively, compared to the non-irradiated sample. This enhancing catalytic activity could be attributed to the changing of the crystallite size of copper, as well as the surface roughness of the composite membrane. © 2019 by the authors. Licensee MDPI, Basel, Switzerland.