In-situ investigation of polyvinyl formal irradiated with GeV Au ions

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Polyvinyl formal (Formvar®) foils were irradiated with 5.4 MeV/u Au ions and analysed in-situ by residual gas analysis and infrared spectroscopy. The experiment was performed at the new materials-research beamline (M-branch) at the universal linear accelerator of the GSI Helmholtz Centre in Darmstadt (Germany). Simultaneously analysing outgassing fragments and changes within the irradiated polymer film allows monitoring details of the degradation process. Ion-induced degradation of polyvinyl formal is characterized by fragmentation of side chains of the polymer backbone. The infrared spectra show the formation of unsaturated hydrocarbons and ketones. A possible degradation mechanism is proposed including the production of enols as reported earlier for degradation of polyvinyl alcohol exposed to gamma radiation.