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Characterization of new Russian detectors based on trans-stilbene.

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Detectors based on organic crystals of trans-stilbene and paraterphenyl are the most effective for simultaneous registration of mixed gamma-neutron fields in the range of 0.1 – 20 MeV, which is an integral part of scientific and dosimetric measurements in nuclear power engineering and nuclear medicine. Currently, organic crystal detectors are not mass-produced in Russia, although in the Soviet Union there were produced in an industrial scale. In 2022-2023, employees of the Federal Research Institute “Crystallography and Photonics” of the Russian Academy of Sciences developed the original technology and produced samples of paraterphenyl and trans-stilbene crystals, which have been used for the manufacturing of the detectors prototypes. To test the scintillation properties of the detectors, the method for determining the light output was used, including the experimental and simulation stages. Light-output measurement and energy calibration was done by determining the location of the Compton edge when irradiating a sample with standard gamma sources. The position of the Compton edge was calculated by differentiating the energy spectrum. Comparing the parameters of the Compton edges for different samples the relative light outputs of the samples have been obtained.

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