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Innovative method of CR-39 radon detector analysis for didactic purposes

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Radon measurement as part of an educational process has proven to be a valuable experience for students. Large citizen-science educational projects have succesfully used solid state nuclear track detectors (SSNTD) to measure radon in schools and homes. Radon concentration measurement with SSNTD is well established and widelly used measurement technique. Automated turn-key systems are available with high level of automation required for routine analysis. On the contrary, in a didactic experiment, personal involvement in the entire analytical procedure is highly desirable.

This paper presents an innovative method of SSNTD detector analysis, to be used in education process, in order to maximise the didactic effect. The main inovation is the implementation of new digital microscope technology, which allows to create a composed digital image of the entire SSNTD detector element of standard 1 cm2 size, with the 200x optical magnification, by digitally combining separate overlapping images. Final digital resolution of the image is aprox. 34,000 dpi. Image is overlayed by calibrated square grid with 1 mm cell size, to allow area determination. Track density is determined by students by two methods. Firstly, by manually counting number of tracks in each 1 mm2 grid cell. Secondly, using free ImageJ software, consisting of as few as possible steps. Calculation of radon concentration from track density is performed in standard way.

Main pedagogical advantage of this method is the hands-on experience with the track density analysis both by manually counting tracks and by software analysis. The image of the whole detector element in such a large resolution allows to get an idea of the actual scale of the tracks. Last but not least, students get their own results of the radon concentration analysis from their home.

Přihlásit do soutěže

Ne

Hlavní autor: VANEK, Miroslav (Technická Univerzita vo Zvolene)

Přednášející: VANEK, Miroslav (Technická Univerzita vo Zvolene)

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