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Digital autoradiography on C-14 labelled PMMA impregnated rock samples using the BeaverTM

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In Finland and Sweden KBS-3 concept has been chosen for disposal of spent nuclear fuel in crystalline rock. Recent transport experiments have shown that heterogeneity of rock may play a major role in transport of radionuclides. Autoradiographic methods has been proven to be able to assist the characterization of heterogeneous structures. In this study we tested a novel digital autoradiographic device called BeaverTM which applies a Micro Patterned Gaseous Detector in order to quantitatively map beta emissions by C-14 atoms. The studied samples were impregnated with C-14 labelled MMA (Methyl MethAcrylate) and polymerized to PMMA using heat. The BeaverTM was then used to determine concentration of C-14 atoms which can then be converted to porosity based on the amount of C-14 intruded into the rock sample. The resulting images show a heterogeneous distribution of porosity which arises from the different porosities of minerals. The samples were chosen from three sites that has been used recently in in situ diffusion experiments: Olkiluoto (Finland), Äspö (Sweden) and Grimsel (Switzerland).

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