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Chemical Analysis with Neutrons at MLZ

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Chemical analysis with neutrons offers a range of methods for element determination. The sample matrix can be characterized as well as the smallest traces. In certain cases, neutron activation analysis (NAA) reaches detection limits down to the ppt/ppq (weight) range. Prompt Gamma Activation Analysis (PGAA) enables a completely non-destructive measurement of the sample bulk. A combination of PGAA and neutron tomography (PGAI-NT) enables spatially resolved analyses. PGAA and NAA are to a certain extent complementary and can be also combined effectively to significantly increase the number of detectable elements. Further possibilities are neutron depth profiling (NDP) and cyclic in-beam activation analysis (cib-NAA). Chemical analysis with neutrons is a useful analytical toolbox for the development of novel materials that require a specific composition or a certain grade of purity. For example, it can be used in the development of fusion reactors or new concepts in nuclear fission technology. We present the capabilities of these methods at MLZ.

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