



Contribution ID: 108

Type: **Poster**

## Chemical analysis with neutrons at MLZ

*Wednesday 9 December 2020 17:40 (20 minutes)*

MLZ offers several instruments for chemical analysis. Prompt Gamma Activation Analysis (PGAA) is located in the neutron guide hall, and uses the strongest cold neutron beam of the world. PGAA is based on radiative neutron capture, and is used for the determination of major and minor components, and several trace elements in the samples non-destructively. The method proved to be unique in the determination of light elements, especially H and B. Many trace elements can be analyzed with much higher sensitivities when using the in-beam activation analysis option.

The same beam is used for Neutron Depth Profiling (NDP), where the concentration profile of certain elements (B, Li) can be determined from the energy loss of neutron induced charged particles. This method has been successfully used in lithium-battery research.

When irradiating the samples in high-flux channels in the reactor, Neutron Activation Analysis (NAA) offers detection limits on the ppb-ppt level for many trace elements. This method has been integrated in our analytical arsenal recently, and has been used for the characterization of meteorites and archaeological objects.

Fast neutrons also generate characteristic gamma radiation, which can be used for the analysis of nearly all the elements with similar sensitivities. Fangas (Fast Neutron Induced Gamma Spectrometry) has been installed this year, and is now available for the users. We expect it to become useful in the analysis of heavy-metal alloys.

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**Session Classification:** Joint poster session of MLZ User Meeting and DN2020

**Track Classification:** UM: Materials Science