

Project abstract

Title: SMART Multi-channel Charge Amplifier for X-RAY Spectrography

Objective

Based on the successful feasibility study, design and ASIC for a multi channel spectrometer for X-Ray spectroscopy, adapted for an analysis machine for mineral samples.

Abstract

The project aims at developing electronics for a multichannel X-ray spectrometer, with amplifiers based on a special purpose ASIC.

In the previous feasibility study a single channel ASIC was characterised, and simulation models were verified for the temperature range at hand (- 100° C), data collection and data processing methods were verified. A direct sampling detector with a sampling speed of 100 MS/S and 100 channels gives a total data rate of 10 Gs/s, putting high demands on choice of data processing. Initial studies indicates that it is achievable with GPU accelerated computations, and pre conditioning of data in each sensor unit, alternative solutions will also be evaluated within the project.

The project further deepens the cooperation between the companies involved and Luleå Technical University, that actively conducts research within analogue electronics, advanced sensors, ASIC, and advanced production technique.

The feasibility study pointed at the need of specialist competence within digital signal processing. A woman specialist in the field has been employed by one of the project parts - Grepit. Her role will be design and development of the signal processing part.

Today Orexplore has an analysis machine for non destructive scanning of mineral samples, with X-ray technology, and measuring elemental concentration and mineral composition of the whole sample volume. This product is now successively launch during spring 2018. A successful FOI-project will enable Orexplore to enhance their product to measuring more elements - specifically precious metals - with a for the mining and exploration industry accepted detection limit.

Co-ordinator: Orexplore AB

Project manager: Mikael Bergqvist Ph.D.

E-mail project manager: mikael.bergqvist@orexplore.com **Phone:** +46 70 1731770

Other project partners: Grepit AB, Luleå University of Technology

Total cost of project: 5 900 000 SEK

Total grant: 2 950 000 SEK

With support from:



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