

Verification of $^{11}\text{B}(p,\alpha_1)^8\text{Be}$ Nuclear Reaction Boron Analysis in Homogeneous Films

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Abstract. The aim of our work was to verify the quantification of boron content by 730 keV and 2640 keV proton beams using Nuclear Reaction Analysis (NRA) and Elastic Backscattering Spectrometry (EBS) analysis. The evaluation procedure of $^{11}\text{B}(p,\alpha_1)^8\text{Be}$ nuclear reaction boron measurements in homogeneous layers in heavy and light matrix was assessed. The sensitivity of our Ion Beam Analysis (IBA) setup to boron analyses was also tested. More common is boron analysis by $^{11}\text{B}(p,p_0)^{11}\text{B}$ elastic backscattering and $^{11}\text{B}(p,\alpha_0)^8\text{Be}$ nuclear reactions. But in the case of (p,p₀) the signal of heavier matrix elements interferes with the boron signal and by lower content it makes boron quantification even impossible. With (p,α₀) it is also possible to obtain a depth concentration profile, but the overall sensitivity is more than one order of magnitude higher in the case of (p,α₁). The achieved measurement sensitivity 15 atomic ppm with (p,α₁) can be easily enhanced by increasing the fluence of protons and inserting an absorber in front of the detector, so that the sensitivity below 1 at. ppm can be reached.