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Deuterium/Hydrogen microscopy in astrogeological material.

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Many primitive meteorites show elevated D/H-ratios relative to terrestrial material. It is believed that this is due to the preservation of the organic molecules which were formed in the presolar molecular cloud [1]. The D/H-ratio varies considerably between different classes of meteorites. This isotopic variation is due to different degrees of mixing of the presolar material with solar system materials [1]. Isotopic measurements of extraterrestrial material collected at Earth provide a way to compare the degree of mixing of the primordial molecules among different solar system material [1].

In recent years a quantitative technique for D/H-ratio microscopy has been developed at Lund Ion Beam Analysis Facility (LIBAF). The technique is derived from the proton-proton scattering technique and has been proven to have the same beneficial features, namely low detection limit, high lateral resolution, and insignificant matrix effects [2, 3]. In this work we present and discuss the results from a measurement on samples from the Tagish Lake meteorite, which is suggested to be one of the most primitive solar system material yet studied [4]. We also present an evaluation of the technique, with results of measurements on a geological standard.

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