Proceedings of ICRC 2001: 3090 © Copernicus Gesellschaft 2001

ICRC 2001

Enrichments of trans-iron nuclei in solar energetic particles observed with ACE/ULEIS

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Abstract. Elements more massive than iron are synthesized in neutron capture processes and have the lowest cosmic abundances. In the solar system composition derived from meteorites the summed abundance of elements from germanium to lead (∼72 to 207 amu) is only $\sim 10^{-4}$ that of iron. The trans-iron portion of the periodic table is therefore relatively unexplored in studies of solar energetic particle composition. Recently, Reames (*ApJ. Letters*, **520**, 411, 2000) reported large (up to ∼1000) enhancements of trans-iron elements in energetic particles from impulsive flares. It may be that the process that enhances the heavy elements in impulsive flares continues beyond iron, bringing the trans-iron species just within reach of current instrumentation with sufficiently large collecting area. In this paper we report on measurements of trans-iron species in impulsive flares and shock-related solar particle events using the Ultra-Low-Energy Isotope Spectrometer (ULEIS) on the ACE spacecraft. The low energy threshold of ULEIS (∼30 keV/nucleon at iron) allows us to search for the rare, ultra-heavy solar particles at low energies where their intensities are the greatest.

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