ABUNDANCES OF COPPER AND ZINC IN STARS OF THE GALACTIC THIN AND THICK DISKS

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ABSTRACT. The spectra of studied stars were obtained with the ELODIE spectrograph at the 1.93-m telescope of the Observatoire de Haute Provence (France). The determination of Cu and Zn abundances was carried out in LTE assumption by model atmosphere method, for Cu the hyperfine structure was taken into account. Cu and Zn abundance trends for thin and thick disk's stars are presented.

Key words: Stars: fundamental parameters; stars: Cu, Zn abundances.

1. Introduction

The nucleosynthesis mechanisms and the relative contributions of different sources by Cu and Zn enrichment are still uncertain. The probable sources of enrichment by Cu and Zn are different objects, such as the massive stars, type II and type Ia supernovae and low- and intermediate-mass stars – stars AGB. These sources can give different contribution to enrichment by these elements for thick and thin disks. Therefore, the dependences of elemental abundances [El/Fe] vs. metallicity [Fe/H] for thin and thick disks can differ. In this paper we present the determination of Cu and Zn abundance and the dependences of [El/Fe] vs. [Fe/H] for thin and thick disk's stars for which the separation according to kinematic criteria has been made earlier.

2. Observations and stellar parameters

The spectra of studied stars were obtained on 1.93 m telescope of the Observatoire Haute Provence (France) equiped with echelle-spectrograph ELODIE. A resolving power is 42000, the wavelength range 4400-6800 ÅÅ has used. Spectrum extraction, wavelength calibration and radial velocity measurement have been performed at the telescope with the on-line data reduction software while straightening of the orders, removing of cosmic ray hits, bad pixels and telluric lines were performed as described in Kats et al. (1998). The spectra processing was done through the DECH20 code (Galazutdinov, 1992). Equivalent widths of lines were measured by Gaussian function fitting. The temperatures were determined with the very high level of accuracy using the line depth ratios. The surface gravity log g was determined using the iron ionization equilibrium assumption, where the average iron abundance determined from FeI lines and Fe II lines must be identical. Microturbulent velocities $V_t$were determined by forcing the abundances determined from individual FeI lines to be independent of equivalent width. The parameter's determination and the separation of thin and thick stars on kinematic criterion was made earlier (Mishenina, 2004).

3. Elemental abundances

Elemental abundances were determined from LTE analysis basing on the atmosphere models by Kurucz (1993). **Copper.** Cu abundance was determined for 171 dwarfs by line profile fitting of the synthetic to stellar spectra using the lines 5105.54, 5218.20, 5782.12 ÅÅ and the STARSP code developed by Tsymbal, 1996. We have taken hyperfine structure of Cu I (Steffen, 1985) into account for the profile calculations. **Zinc.** Zn abundance for 65 dwarfs was determined with equivalent width measurements. The log gf-values for these lines were taken from (Kovtyukh, Andrievsky, 1999) and WIDTH9 code developed by (Kurucz, 1993) was used. [Zn/Fe], [Cu/Fe] and [Cu/Zn] vs. [Fe/H] for different populations are shown in Fig.1, Fig.2. and Fig.3. Thick disk stars are marked as filled circles, and thin disk stars as open circles.

4. Results and conclusions

We have determined Cu and Zn abundances for 171 and 65 stars, correspondingly. The metallicities of study stars is in the range -1.2 $<$ [Fe/H] $<$ +0.4.

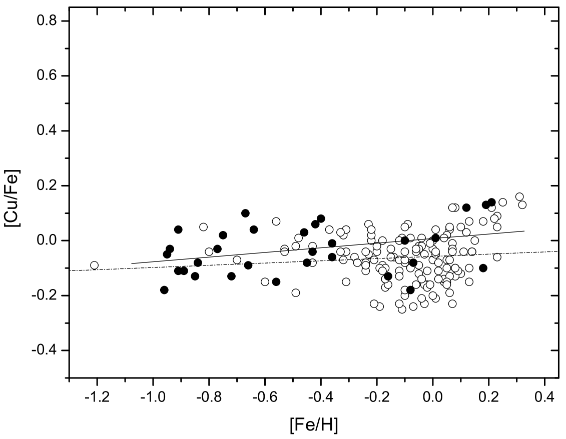

Figure 1: The run of [Cu/Fe] with [Fe/H]. Thick disk stars are marked as filled circles, and thin disk stars as open circles.

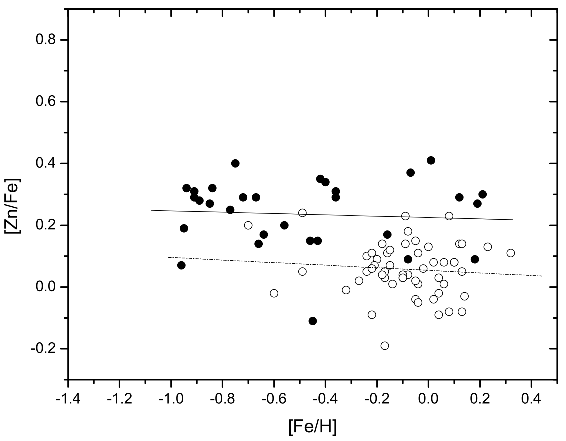

Figure 2: The run of [Zn/Fe] with [Fe/H]. The notation is the same as in Fig.1.

Among them 33 stars belong to thick disk populations according to their kinematics. As see from Fig.1, 2, the Zn abundance shows the higher dispersion than Cu abundance. The dependences of Cu and Zn abundances vs. [Fe/H] are also differ for these elements, that may be evidence of the various mechanisms responsible for production of these elements.

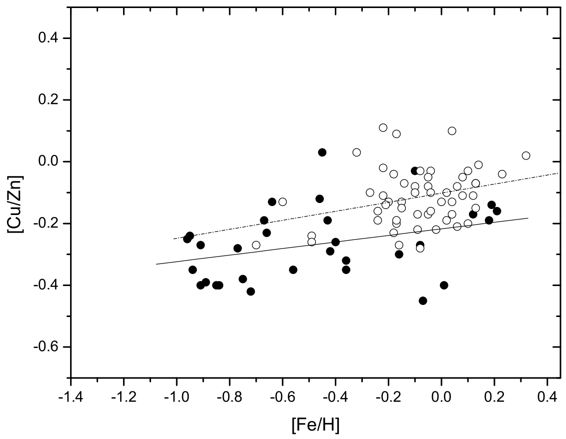

Figure 3: The run of [Cu/Fe] with [Zn/Fe]. The notation is the same as in Fig.1.

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