



ELSEVIER

Journal of Magnetism and Magnetic Materials 226–230 (2001) 1510–1512



[www.elsevier.com/locate/jmmm](http://www.elsevier.com/locate/jmmm)

# Distributions of hyperfine parameters in nanocrystalline $\text{Fe}_{78}\text{Al}_4\text{Nb}_5\text{B}_{12}\text{Cu}_1$ alloys

Sung Hyun Yoon<sup>a,\*</sup>, Hi Min Lee<sup>b</sup>, Sung Baek Kim<sup>b</sup>, Chul Sung Kim<sup>b</sup>

<sup>a</sup>*Department of Physics, Kunsan National University, 68 Miryong-Dong, Kunsan 573-701, South Korea*

<sup>b</sup>*Department of Physics, Kookmin University, Seoul 136-702, South Korea*

---

## Abstract

Magnetic properties of nanocrystalline  $\text{Fe}_{78}\text{Al}_4\text{Nb}_5\text{B}_{12}\text{Cu}_1$  alloy were investigated by Mössbauer spectroscopy. As-quenched amorphous ribbon was flash annealed at temperature range of between 350 and 700°C to obtain different stages of crystallization. Mössbauer spectra consist of both sharp sextet due to BCC-Fe(Al) phase and two binomially distributed sextets due to amorphous matrix and interface layer, respectively. Distribution of various hyperfine parameters were obtained and special focus was given to the structure of interfacial layer. The flash anneal starts the crystallization at 400°C, and shows  $\text{Fe}_2\text{B}$  phase at 550°C. The fraction of crystalline phase produced by annealing was as high as 46% at 550°C. © 2001 Elsevier Science B.V. All rights reserved.

*Keywords:* Mössbauer spectroscopy; Amorphous alloys; Nanocrystalline materials

---