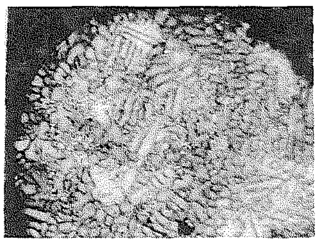
07.9–13 MICROSTRUCTURE AND PHASE STUDIES IN SOME ATOMIZED METAL ALLOYS. By E.M. Uygur, Dept. of Metallurgical Engineering, Middle East Technical University, Ankara, Turkey.

Cast iron (3.63%C, 0.037%S, 0.12%P, 2.84%Si), steel (0.54%C, 0.013%S, 0.027%P, 0.22%Si, 0.67%Cr), brass (62%Cu, 28%Zn), Aluminum (98%), Copper (99%) powders were manufactured by vertical and horizontal atomization techniques in two pilot plants in the METU, Ankara (Uygur, Proceedings Intl. P/M Conf. in Europe, Italy, 1982). In the horizontal atomization plant air and liquid nitrogen atomizing media were employed, whereas in the vertical atomization plant water, air, or inert gases were used. The microstructure and phases were studied by means of SEM and XRD techniques. A dendritic structure was observed in the atomized powders the cooling rates of which were controlled not only by the type of the atomizing media but also the particle size. The phases that appeared were not very much different in both the vertically and horizontally atomized powders. The primary constituents of the cast iron powders were found to be retained austenite, ferrite, some amount of cementite. Martensite was also observed in the water and liquid nitrogen atomized powders. No glassy phases were observed as the rates of solidification encountered were not high enough. A microcrystalline structure however was observed in the liquid nitrogen atomized powders.



Atomized Copper, 800X.

07.9–14
POLARIZED NEUTRON DIFFRACTION STUDY OF POWDERED Li-Ti FERRITE
L. Chełmicki, B. Kowalska, S. Ligenza, M. Piotrowski, H. Ptasiewicz-Bąk. I.A.E., Świerk, Poland.

The powder ferrite $Li_{0.975}Ti_{0.95}Fe_{1.075}O_4$ was examined by polarized neutron diffraction at room temperature with the SSN-2 polarized spectrometer at the "Maria" reactor in Świerk. The sample was pressed into discs of a diameter up to 20 mm each in order to reduce the depolarization factor. Linear depolarization coefficient was μ = 10 m, which enabled to perform experiments with the polarized beam.

Neutron diffraction patterns were collected at two configurations of external magnetic fields, parallel and perpendicular to the scattering vector. The magnetic contributions to Bragg reflection have been determined by comparing the diffraction pattern measured in two neutron spin configurations. The magnetic moment configurations in the tetrahedral and octohedral sublattices have been discussed.

07.9–15 THE CRYSTAL STRUCTURE OF A NEW MAGNETIC PHASE RELATED TO THE SIGMA PHASE: $Nd_2Fe_{14}B$. By Clara B. Shoemaker and David P. Shoemaker, Department of Chemistry, Oregon State University, Corvallis, OR 97331, USA, and Robert Fruchart, Ecole Nationale Supérieure d'Ingénieurs Electriciens de Grenoble, 38042 Saint Martin d'Hères, France.

The crystal structure of the tetragonal phase in the Nd-Fe-B system with remarkable magnetic properties described by M. Sagawa, S. Fujimura, M. Togawa, H. Yamamoto, and Y. Matsuura (Conference on Magnetism and Magnetic Materials, Nov. 1983, Pittsburgh, USA, Paper EB01), has been determined by X-ray diffraction. Crystal data: $Nd_2Fe_{14}B$, tetragonal, $P4_2/mnm$, a= 8.804(5), c=12.205(5) Å, Z=4, ρ_x=7.59 g cm^{-3}, R= 0.040 (575 refl. I>2σ). MoKα, MULTAN78, full-matrix least-squares refinement. The structure is best described in terms of nets perpendicular to the z axis. In the mirror planes at z=0 and 1/2 triangular nets are formed by Nd, Fe, and B atoms. Between each pair of adjacent mirror planes are sandwiched two puckered sigma-phase main-layer-type nets (z~1/8 and 3/8) and one sigma-phase subsidiary-layer-type net (z~1/4) formed by Fe atoms. The Nd atoms form rhombs surrounded in the plane by Fe and B atoms, and above and below by Fe atoms. There are strings of alternating Nd and Fe (CN14) atoms parallel to the z axis corresponding to the rows of closely spaced CN14 atoms in the sigma phase in that direction. The atom types, positions, coordinations, and correspondences with sigma-phase atoms (letters A through E) are as follows. In the mirror planes: Nd1, f, 3Nd+16Fe+1B, E; Nd2, g, 2Nd+16Fe, E; Fe1, c, 4Nd+8Fe, --; B, f, 1Nd+6Fe (trig. prism+1), --. In the sigma "main" layers: Fe2, k, D; Fe3, k, C; Fe5, j, B (all here icosahedral); Fe6, e, A (icosahedral+1). In the sigma "subsidiary" layers: Fe4, j, 2Nd+12Fe, E.

After completion of our study we found a news report in Science 223, 920 (1984) showing the atomic arrangement in $Nd_2Fe_{14}B$ as determined with neutron diffraction by J. Herbst, J. Croat, F. Pinkerton, and W. Yelon; their results will be published in Physical Review B1 (April 1984). Our results appear to be in agreement with theirs.