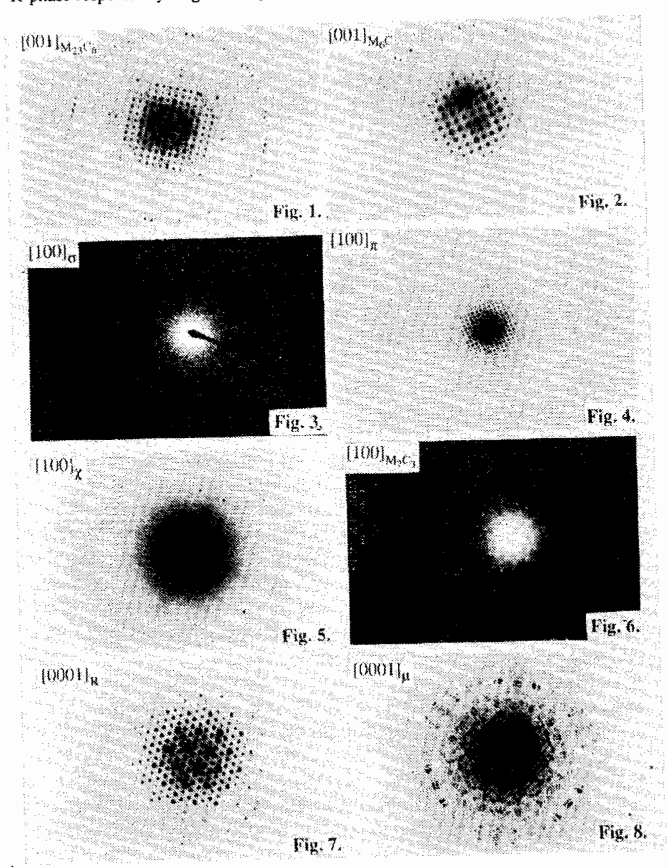
displacements between ZOLZ and FOLZ for σ-phase and π-phase. Morever, the radii of the FOLZ rings in Figs 3, 4 and 5 reveal that c=4.54 Å and a=6.47 Å and a=8.8037 Å for σ-phase, π-phase and χ-phase respectively.

M_7C_3 has the space group Pnma with a= 4.526 Å, b=7.010 Å and c= 12.142 Å. Its pseudo-hexagonal [100] axis pattern in Fig.6 shows similar spacings in comparison with the pattern from the [0001] zone of R-phase ($R\bar{3}$, a=10.903 Å and c=19.342 Å) in Fig.7. However, the radii of the FOLZ rings are very different, which give a=4.526 Å for M_7C_3 and c=19.345 Å for R-phase respectively.

Because of the very long c-axis of μ-phase ($R\bar{3}m$, a=4.754 Å and c=25.71 Å) the pattern of [0001] has a distinctive feature: small radius for the FOLZ ring and several higher order Laue zones may appear (Fig.8).

Figs.1-8. CBED patterns. **Figs.1-5.** The [001] zone axes of $M_{23}C_6$, M_6C, σ-, π- and χ-phase respectively. **Figs.6-7.** The [100] and [0001] zone axes of M_7C_3 and R-phase respectively. **Fig.8.** The [0001] zone axis of μ-phase.



PS-20.01.10 **STUDY OF Z PHASE IN MB25 Mg ALLOY.**

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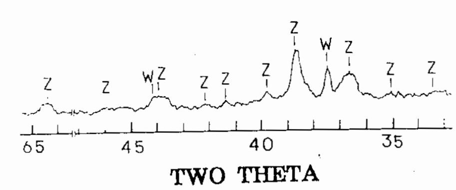
The microstructures of Mg-Zn-Y system alloys were studied by Padezhnova et al. (1982). By means of x-ray diffraction (XRD) analysis, a Z phase was identified in this system alloys, but its crystallographic structure was not determined out. The present paper gives the results of study on the structure of the so-called Z phase in literature.

The experimental material is as-cast MB25 alloy with compositions of 5.56~5.78 wt-%Zn, 0.47~0.6 wt-%Zr, 0.89~1.72 wt-%Y and balanced Mg. By means of electrolysis (Zhang, 1990), the extracted powder is obtained from the alloy and examined by XRD. The figure below shows the XRD pattern which contains the so-called W and Z phase (Padezhnova et al., 1982) peaks. However, detailed examinations by conventional selected area diffraction (SAD), convergent beam diffraction (CBD) and energy dispersive spectrum (EDS) analysis show that the icosahedral quasicrystal (QC), $MgZn_2$-type Laves phase, W phase and an ordered structure of W phase (W′ phase) are present. It is clearly that the distinct XRD peaks from the Z phase in the XRD pattern are in fact coincident with those peaks from the icosahedral QC and $MgZn_2$-type Laves phase, as listed in the table below. The XRD peaks from the QC in rapidly solidified Mg-Al-Zn alloy (Rajasekhara, 1986) are given out for comparison. It is necessary to point out that the QC in the Mg-Zn-Y system has never been reported before.

Table Indexing of the XRD Peaks from the Z Phase

Exper.		indexing		Z phase		QC-MgAlZn	
d(nm)	I/I_o	QC	Laves	d(nm)	I/I_o	d(nm)	I/I_o
0.2455	53	(100000)		0.245	50	0.2423	51
0.2328	100	(110000)		0.234	100	0.2292	100
0.2267	24		(021)	0.225	12		
0.2182	13		(004)	0.217	7		
0.2061	32	(111101)		0.206	33	0.2032	23
0.198	13		(113)	0.1985	16		
0.1449	21	(101000)		0.1442	30	0.1428	19

Padezhnova E M et al. (1979). Akademiia Nauk SSSR, Izvestiia, Metally, No.4, 204-208 (in Russian)
Zhang S Q (1990). Acta Metall. Sinica, **3**, 110-115
Rajasekharan T et al. (1986), Nature, **322**, 528-530



PS-20.01.11 **THE STRUCTURAL REARRANGEMENT ASSOCIATED WITH LITHIUM INSERTION INTO V_6O_{13}.**

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In spite of the fact that V_6O_{13} is one of the most common cathode materials used in modern battery design, the structural mechanisms of lithium insertion are still not properly understood. Conventional wisdom says that phases $Li_xV_6O_{13}$, where x=1, 4 and 8, are created successively on lithium insertion. It is known, however, that difficulties can arise with respect to battery reliability and reproducibility. These may well result from difficulties incurred in obtaining