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CUBIC FERRITE WITH A HIGH UPPER FREQUENCY LIMIT

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ABSTRACT OF THE DISCLOSURE

The invention concerns cubic lithium ferrites used in application involving scalar permeability and defined by the formula

$\frac{1}{4}\{Li_2O; 4.5[(1-x)Fe_2O_3, xAl_2O_3]\}; 2yMnO_2; zCoO$

wherein:

x lies between 0 and 0.25
y lies between 0.15 and 0.6
z lies between 0.04 and 0.35

The ferrites according to the invention have a higher frequency limit than conventional ferrites.

The present invention, relates to cubic lithium ferrites.

These materials are used in applications involving scalar permeability, for example for the fabrication of magnetic cores.

Known materials of this kind have an upper frequency f_L of the order of a few tens of mc./s., at which relaxation phenomena cause a rapid rise of magnetic loss and lowering of the initial permeability.

It is an object of this invention to provide ferrites with a higher frequency limit than conventional ferrites. The ferrites accordnng to the invention have a composition defined by the formula:

$\frac{1}{4}\{Li_2O; 4.5[(1-x)Fe_2O_3, xAl_2O_3]\}; 2yMnO_2; zCoO$

wherein:

x lies between 0 and 0.25
y lies between 0.15 and 0.6
z lies between 0.04 and 0.35.

The invention will be better understood from the following description of the method of manufacture of a ferrite.

The raw materials used are the compounds Fe_2O_3, Al_2O_3, MnO_2, CO_3Li_2 and CoO with a degree of purity higher than 99.5%. The compounds are proportioned by weight, crushed in distilled water for 24 hours in steel ball-mills and dried. The resulting mixture is pre-sintered at 800° C. for 2 hours and crushed once more as above. When dried, the powder is transformed to a granulate by adding 15% by weight of aqueous polyvinyl alcohol solution. The granulate is pressed at a pressure of 1 ton

per cm.^{2}. The resulting parts are sintered for 3 hours at a temperature T_f between 1100° and 1200° C.

Of course, certain details of the process can be varied without departing from the spirit of the invention. However, it is to be noted that the sintering temperature is relatively critical.

If the sintering temperature is less than 1100° C., the resulting material is crumbly. If the temperature is above 1200° C., the material decomposes.

The following table shows the characteristics of the material obtained, against parameters x, y and z and temperature T_f, μ being the initial permeability:

Example No.	x	y	z	Tf	μ	f_L mc./s.
1	0	0.6	0.201	1,100	7	100
2	0	0.6	0.268	1,100	5	150
3	0	0.6	0.335	1,100	4	200
4	0.05	0.6	0.201	1,100	7	110
5	0.05	0.6	0.268	1,100	4.8	160
6	0.05	0.6	0.335	1,100	4.6	190
7	0.1	0.6	0.134	1,100	8	110
8	0.1	0.6	0.201	1,100	6.5	190
9	0.1	0.6	0.268	1,100	5	150
10	0.1	0.6	0.335	1,100	4	160
11	0.15	0.6	0.0402	1,100	7	100
12	0.15	0.6	0.201	1,100	5	150
13	0.15	0.6	0.268	1,100	4	150
14	0.15	0.6	0.335	1,100	3.8	200
15	0	0.6	0.201	1,150	8	100
16	0	0.6	0.268	1,150	5.6	150
17	0	0.6	0.335	1,150	5.6	150
18	0.05	0.6	0.268	1,150	5.4	150
19	0.05	0.6	0.335	1,150	4.2	200

What is claimed is:

1. A ferrite composition having low losses in the frequency range between 50 and 200 mc./s. defined by the formula:

$\frac{1}{4}\{Li_2O; 4.5[(1-x)Fe_2O_3, xAl_2O_3]\}; 2yMnO_2; zCoO$

wherein:

$0 \leqslant x \leqslant 0.25$
$0.15 \leqslant y \leqslant 0.6$
$0.04 \leqslant z \leqslant 0.35$

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