MAGNETIC PROPERTIES OF PRIMITIVE NON-CARBONACEOUS CHONDRITES, N. Sugiura and D.W. Strangway, Department of Geology, University of Toronto, Toronto, Ontario, Canada, M5S 1A1.

Magnetic properties of primitive (low-petrologic) non-carbonaceous chondrites are of particular interest because (1) their metallic grains are relatively fine-grained and could possess stable remanence. (This is important because most ordinary chondrites have very unstable remanence whose origin is not well known); (2) they are supposed to contain a relatively small amount of plessite, an intergrowth of kamacite and taenite, which changes its structure when heated to 550°C and therefore its presence is troublesome for paleointensity determinations; (3) they are likely to preserve the record of the magnetic field in the early solar system as recorded in carbonaceous chondrites, because they were not reheated to high temperatures.

In this study we describe the magnetic properties of Chainpur (LL3), ALHA77304 (LL3), Mezo Madaras (L3), Bjurbole (L4) and Indarch (E4) in detail. Three chondrites (Yamato 74191 (L3), Yamato-a (E3), Abee (E4)), which were previously studied, are also included in the discussion. Some petrological and magnetic properties of these chondrites are summarized in Table 1.

The NRM intensity of E chondrites is by far larger than that of L and LL chondrites. The difference is only partly explained as due to the difference in the amount of ferromagnetic materials (which is measured as saturation magnetization: Js). The bulk coercive force (Hc) of L and LL chondrites is mainly determined by the amount of plessite. Cohenite and schreibersite and their grain sizes are important factors determining the Hc of E chondrites.

NRM in primitive chondrites are generally more stable than those in metamorphosed chondrites. The difference in NRM stability seems to be due to the presence of coarse, well-annealed kamacite in metamorphosed chondrites.

Indarch, Yamato-a and Yamato-74191 have a single component NRM. NRM in Indarch and Yamato-a is less stable than ARM and interpreted as a partial thermoremanence (pTRM) acquired after a shock event. The NRM in Yamato-74191 was probably acquired during slow cooling.

Chainpur and ALHA77304 have a two-component NRM, which could be interpreted as a primary TRM (or depositional remanence: DRM) plus a pTRM.

Abee has random NRM components and Bjurbole has partially random NRM components. The former can be interpreted as a typical DRM, while it is probably not possible to interpret the latter as a DRM plus a pTRM, because the metamorphic temperature for type 4 chondrites exceeds 700°C. An alternative explanation, random NRM due to anisotropy, is proposed, but not yet confirmed experimentally.

NRM in Mezo Madaras is similar to that in Bjurbole, i.e. partially random NRM.

Paleointensities were estimated with the ARM method of Thellier's method. The paleointensities for E chondrites are definitely larger than those for L and LL chondrites. Because in one meteorite the components are random (i.e. conglomerate test) and in others there is evidence of primitive components we conclude that these do record primitive solar system fields. The very high fields recorded by the enstatite chondrites suggest that these were formed in strong magnetic fields.

TABLE 1

	Bj	Ch	74191	MM	77304	Y-a	Ab	In
type	L4	LL3	L3	L3	LL3	E3	E4	E4
friable	o	o	x	x	x	x	x	x
chondrule rich	o	o	o	o	o	m	x	m
breccia	x	o	x	o	o	x	o	x
plessite	o	o	o	o	x	x	x	x
slow cooling	o	o	o	o	m	-	x	m
shock	x	x	x	m	x	m	x	m
age (b.y.)	4.5	-	-	-	4.5	-	4.5	-
NRM (10-4emu/g)	1.5	4.3	1.5	3.7	4.3	133	800	579
Js (emu/g)	13	11	21	17	13	48	82	66
Hc (Oe)	630	89	30	42	12	12	14	15
Hp (Oe)	.25 .60	<.74	.13	.15	.45	>10	7	15.7

m: moderate; -: unknown; Hp: paleointensity