THE SÃO JOÃO NEPOMUCENO, IVA STONY-IRON.

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A mass of about 15 kg was found at vicinities of São João Nepomuceno (Minas Gerais State) and donated in 1960 to Museu Nacional, Rio de Janeiro. In 1973 one half of the meteorite was donated to Smithsonian Institution. The main mass was elongated with the average dimensions 19.5x10x9.5 cm and significantly weathered.

In polished and etched sections it displays a messy texture of metal and silicates, with the latter comprising about 20% of the surface area heterogeneously distributed, preferentially on parent taenite crystals grain boundaries. Those silicate-rich regions resemble those in the stony-iron Steinbach.

The metal matrix shows a beautiful polycrystalline fine widmanstatten structure, with long kamacite bands of 0.30 0.05 mm wide. Kamacite shows Neumann bands and micro hardness HV 170 15. Taenite and plessite cover around 50% of the area. Many kinds of plessite fields typical of IVA irons are present.

Terrestrial corrosion has selectively attacked along widmanstatten grain boundaries and fissures. It presents many aggregates of austenite grains, ranging from few mm to 8 cm in diameter. Many individual grains are separated by a 0.6-0.9 mm wide grain boundary of kamacite ribbons and others grains by the silicate bearings rich areas. Troilite have been shock-melted but taenite and plessite exhibited undisturbed M-profiles. Neither Schreibersite nor rhabdite were observed.

Polished thin sections present a silicate texture assemblage constituting by ortho and clino bronzite and tridymite; they occur in mutual contact altogether with troilite.

SJN is unusual in their content of silicates and is close related to Steinbach. The SB is richer in silicates (50%), and was classified as stony-iron [1] and from high Ni-IVA trend. The SJN contains less silicate (~20%), from low-Ni IVA trend and is also classified by many authors as stony-iron.

Group IVA is the most extensively debated iron meteorite group in terms of metallographic cooling rates [2-7]; indeed it remains enigmatic with a thermal evolution quite different from other magmatic irons.

SJN is one of silicate–rich bearing IVA irons that exhibits minerals with density differences not supported in asteroidal core models with very slow cooling rates. The breakup and reassembly model [7] try to explain the complexity of the IV A irons, in special SJN and ST as could provide hot and cold fragments thermally equilibrated and ejected debris reaccreted.

A new focus on the matters should be considerate, that is the solidification of iron and stony-iron meteorites from a melt under microgravity conditions [8]. Here the melted target material may have formed two immiscible liquids (metal-sulfide and silicate) in a related process involving little density separation. In this case the policrystalinity assemblage of the São João looks like a welded breccia, possibly formed by a catastrophic fragmentation and reassembled under microgravity condition.

References: [1] Döfler *et al* (1965).*Min.Pet.Mitt*.16:413-429. [2] Reid *et al*. (1974). *EPSL*, 22:67-74. [3] Bild, R.W. & Wasson, J.T. (1976). *Min.Mag.*40: 721-735. [4] Prinz *et al.*(1984) *MAPS*.19:291-292. [5] Schaudy *et al.* (1972).*Icarus*.17:174-192. [6] Rasmussen *et al*.(1995).*GCA* 59:3049-3059. [7] Scott *et al.*(1994), *Meteoritics.*29: 530-531. [8] Budka *et al.*(1996). The Minerals, Metals & Material Society, 49-57.