IMPACT ORIGIN OF DARK INCLUSION: NUEVO MERCURIO c H5-6 ORDINARY CHONDRITE K. E. Cervantes de la Cruz[1, 2], F. Ortega Gutiérrez[2], L.A. Alba Aldave[3], A.M. Reyes-Salas[3], B. S. Ángeles-García[3]., M.A. Montoya Pérez [1]Departamento de Física, Facultad de Ciencias, *Universidad Nacional Autónoma de México. Av. Universidad 3000, Col. UNAM, Coyoacán 04510, Distrito Federal, México. karina-cervantes@ciencias.unam.mx. [2]Instituto de Ciencias Nucleares, *UNAM, [3]Instituto de Geología, *UNAM.

Introduction: Nuevo Mercurio (c) is the official name of a genomictic breccia H 5-6 with shock stage S3. It was find at Nuevo Mercurio strewnfield, Zacatecas state, Mexico. Main characteristics of Nuevo Mercurio (c) are the presence of H6 clasts, a dark inclusion, and coarse metal-troilite aggregates.

We cut three slides from the sample and prepared two polish slide samples. We saw that black clast is in one of the slides, but is not connected with a shock veins with the other slides. The goal of this work is locking for the origin of a dark inclusion in the sample.

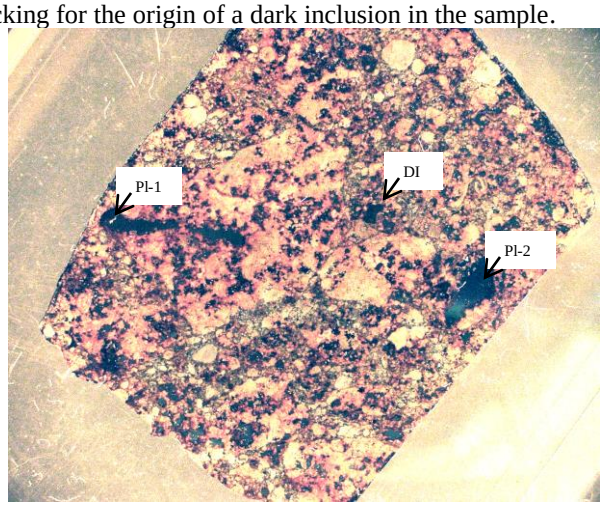

Fig. 1 NM (c) meteorite components. The dark inclusion (DI) is between the two big clasts. Each clast shows coarse metallic grains Pl-1 and Pl-2, respectively.

Methods: Optical microscopy was performed on two thin sections with a Nikon petrographic microscope equipped with transmitted and reflected light.

Minerals were analyzed with JEOL JXA 8900R electron probe microanalyzer (EPMA) (Laboratorio Universitario de Petrología, UNAM). Analyses were conducted at 20 keV accelerating voltage with a beam current of 20 nA. The beam size is 1 µm with 10-40 s counting times. ZAF correction was made to all data obtained and for Ca-poor, Ca-rich pyroxenes, olivines and chromite. A probe current of 10 nA was employed for feldspars. Natural and synthetic phases of well-known compositions were used as standards. We critically evaluated the 306 WDS analyses based on their total stoichimetries. SEM backscattered electron (BSE) imagery was used to investigate microtextures, porosity and mineralogy of chondrules**.**

Mineralogy, Petrology and Classification: NM (c) looks as a breccia (Fig. 1). All chondrules experienced mechanical deformation. The meteorite has different components: clasts with coarse metallic aggregates and a dark inclusion inside a chondritic matrix or host. The big clast encloses a coarse metallic grain (Pl-1), chondrules, and has more microcrystalline material than the host matrix (Fig. 1). The dark inclusion (DI) is between two clasts.

Dark Inclusion Characteristics: The dark inclusion (DI) in NM (c) has a rectangular form and sub-angular borders. It is 870 x 460 µm in size. With transmitted light, it is distinctly darker than the host and contains many elliptical objects from translucent to transparent (20-180 µm). The elliptical objects are embedded in a dark matrix with abundant troilite and minor Fe-Ni metal and chromite. The dark matrix was only observed in backscattering images. DI matrix is composed by olivine and minor pyroxene that show planar fractures and jigsaw-like fractures. The joints are filled with sub-micron to micron-sized troilite melt droplets. The central-left part in Fig. 2 shows a dark zone (DI) corresponding to Mg-rich zoned pyroxene. The characteristics of the elliptical objects are similar to the "augen" described by Zolensky et al. [1] and Kojima et al. [2]. Augen consists of coarse euhedral olivine grains (5-26 µm diameter) and anhedral Ca-poor pyroxene with minor amounts of interstitial Na-rich glass and sulfide. This is similar to porphyritic olivine chondrules.

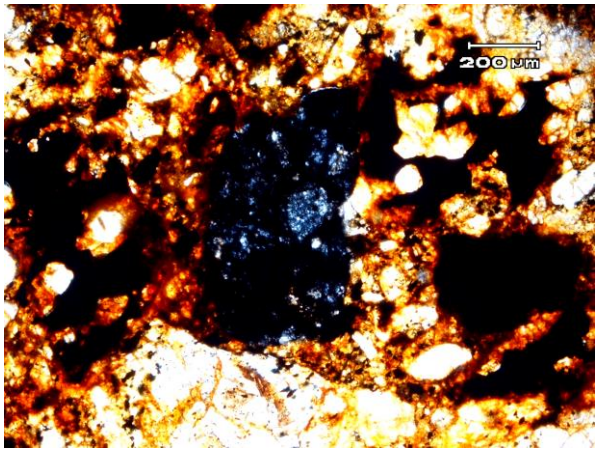

Fig. 2 The image shows elliptical olivine "augen" and fragments that are embedded in troilite-rich opaque matrix.

Discussion: Dark inclusions in NM (c) (DI) have been described mainly in carbonaceous chondrites, unequilibreated ordinary chondrites, howardites and eucrites [1, 2]. For example, "MNC-1" is a dark inclusion in Manych LL3.4 chondrite distinct from DI in CV3 chondrites. Its texture and mineralogy suggest that it experienced a complex sequence of alteration and metamorphism, including strong shock-induced melting probably in the meteorite parent body [2]. Our DI description is similar to the object descriptions of Kojima et al. [2] because of the presence of Fe-Ni-rich augen-like objects although DI is sulphide-rich. In fact, the DI aspect is quite similar to melt pockets as described by [3]. They explained that sulphide melt material forms a network surrounding unmelted chondritic constituents, and penetrates planar fractures and joints of minerals; this feature likely formed upon stress relaxation behind the elastic precursor shock wave. However, DI was removed from its original position because there are no veins or silicates that connected the inclusion with the host.

Conclusion: We concluded that the dark inclusion is a melt pocket-like fragment derived from the clast.

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References: [1] Zolensky M.E. et al. (1993) Proceedings LPS XXIV, pp. 1583-1584. [2] Kojima T. et al. (2000) Antarctic Meteorite Research 13, 39-54. [3] Stöffler D. et al. (1991) GCA 55, 3845-3867.