PMM/A-76

COMISION NACIONAL DE ENERGIA ATOMICA
DEPENDIENTE DE LA PRESIDENCIA DE LA NACION

SEPTIMO CURSO PANAMERICANO DE METALURGIA

Dentro del Programa Multinacional de Metalurgia
(Programa Regional de Desarrollo Científico y Tecnológico - OEA)

OXIDACION SUPERFICIAL DE LOS METALES Y ALEACIONES

Dr. J. Bénard

FASCICULO II

Departamento de Metalurgia
Buenos Aires - Argentina
1971

PMM/A-76

COMISION NACIONAL DE ENERGIA ATOMICA
DEPENDIENTE DE LA PRESIDENCIA DE LA NACION

SEPTIMO CURSO PANAMERICANO DE METALURGIA

Dentro del Programa Multinacional de Metalurgia
(Programa Regional de Desarrollo Científico y Tecnológico - OEA)

OXIDACION SUPERFICIAL DE LOS METALES Y ALEACIONES

Dr. J. Bénard

FASCICULO II

Departamento de Metalurgia
Buenos Aires - Argentina
1971

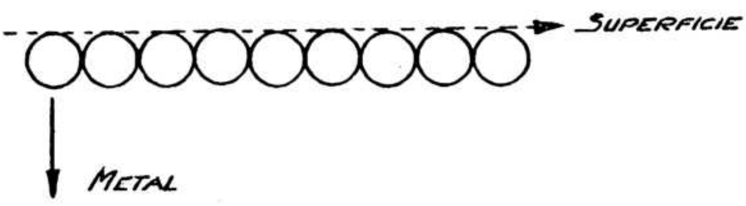


Fig. 1

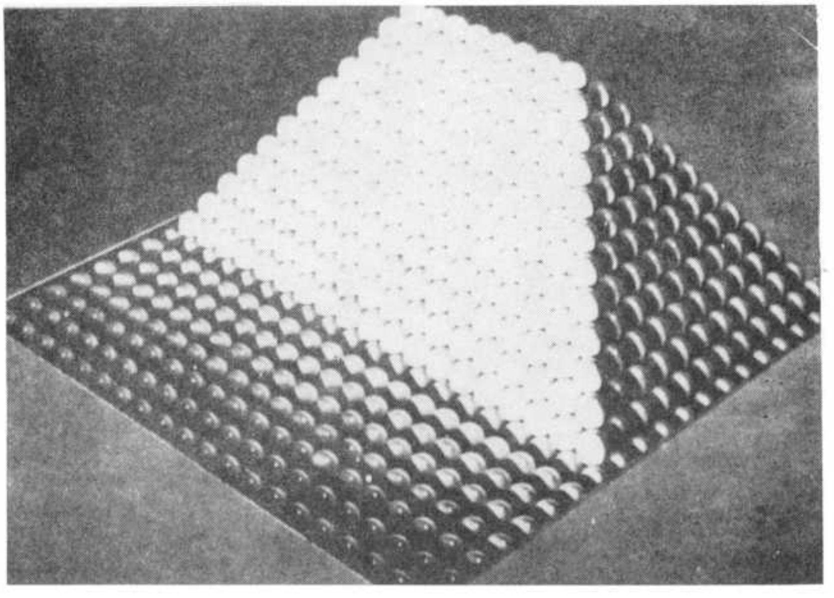


Fig. 1 - a) plano (111)

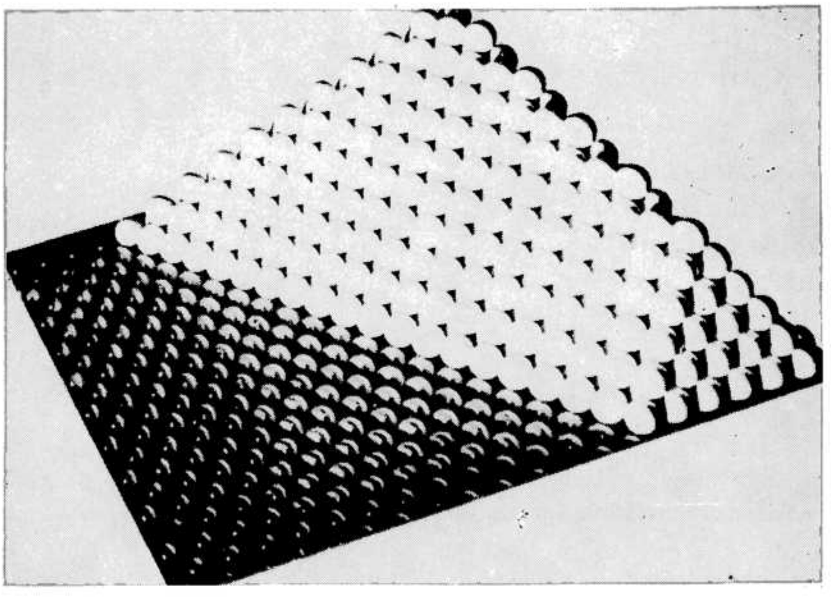


Fig. 1 - b) plano (100)

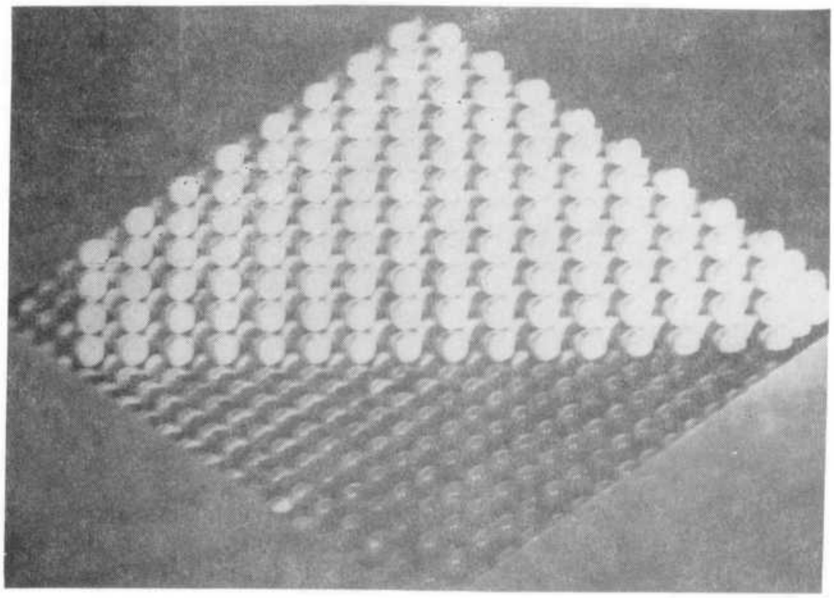


Fig. 1 - c) plano (110)
en f.c.c.

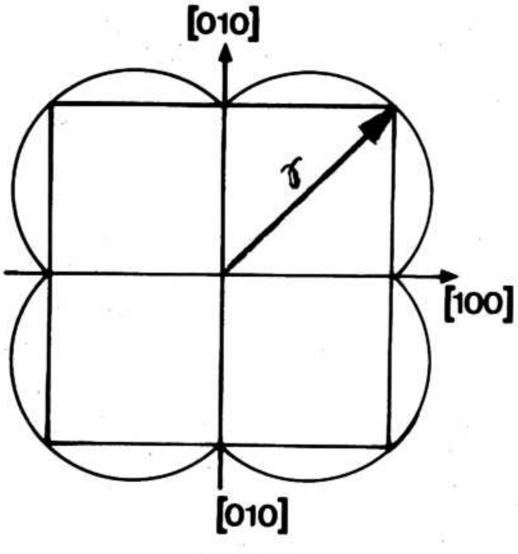


Fig. 2
Variación de la energía superficial γ en función de la orientación en un sistema cúbico.

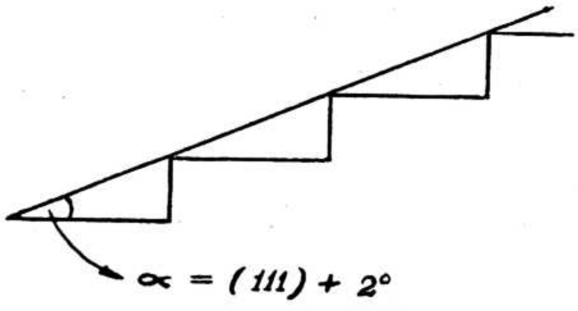


Fig. 3
Formación de defectos - escalones

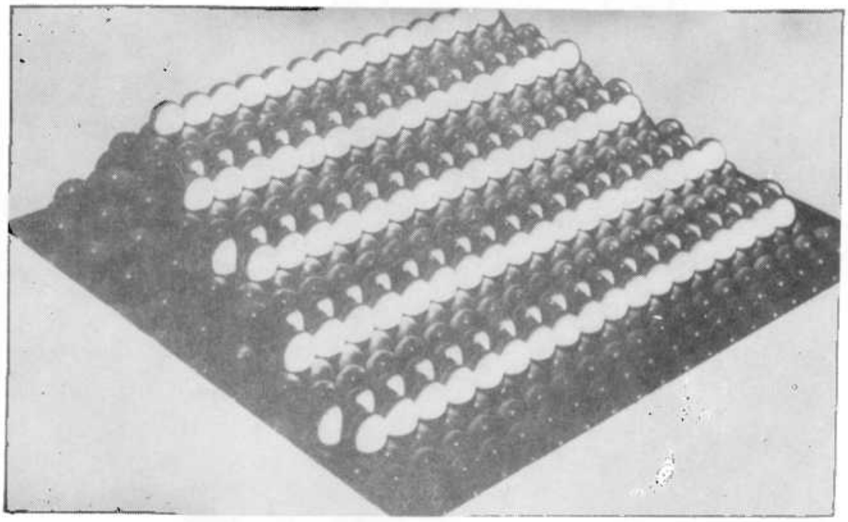


Fig. 4 - a) plano (221) en f.c.c.;

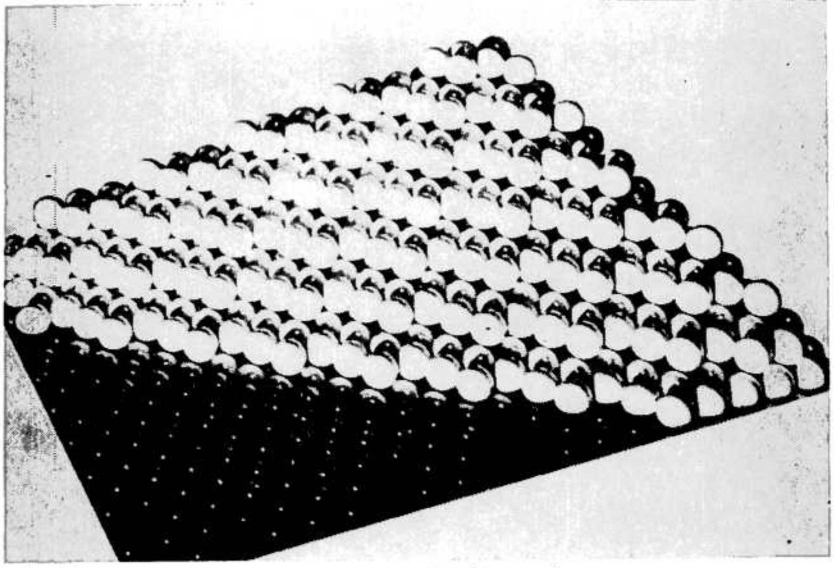


Fig. 4 - b) plano (421) en f.c.c.

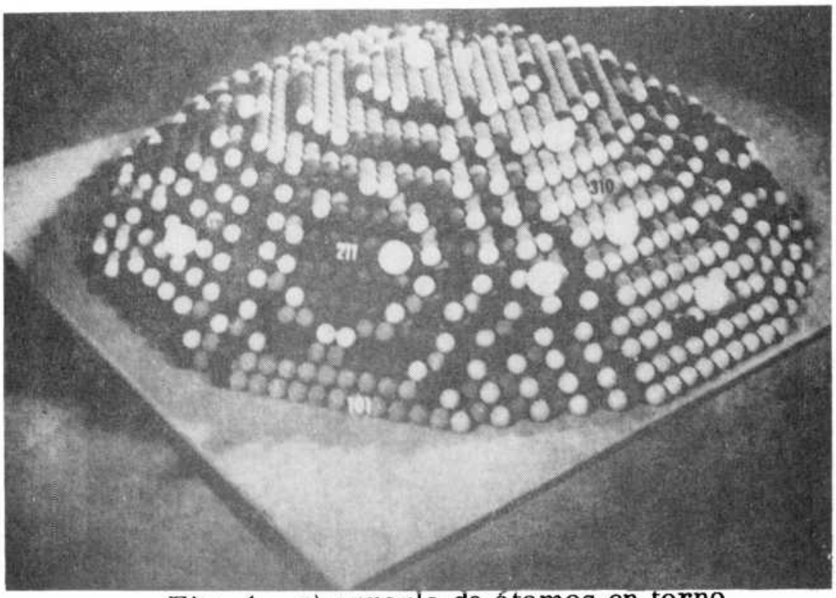


Fig. 4 - c) arreglo de átomos en torno de un polo de índices simples

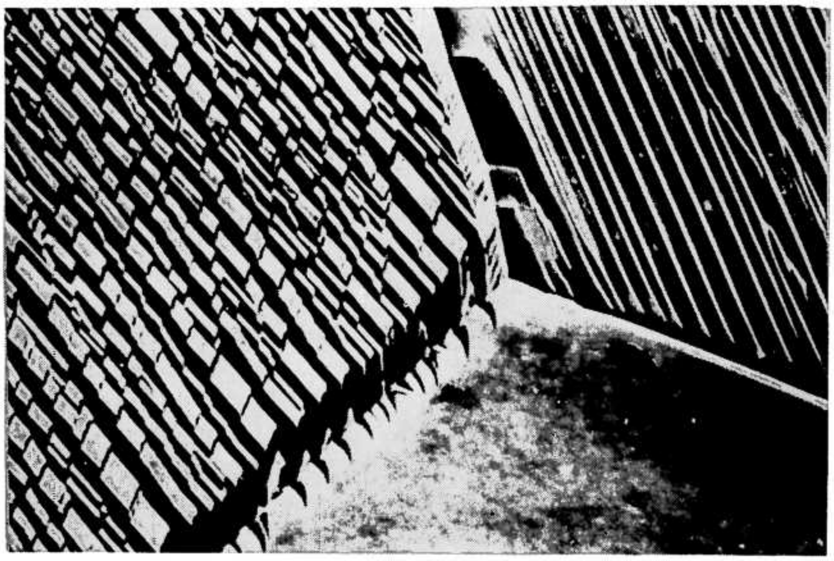


Fig. 5 - Estriación superficial del hierro α.

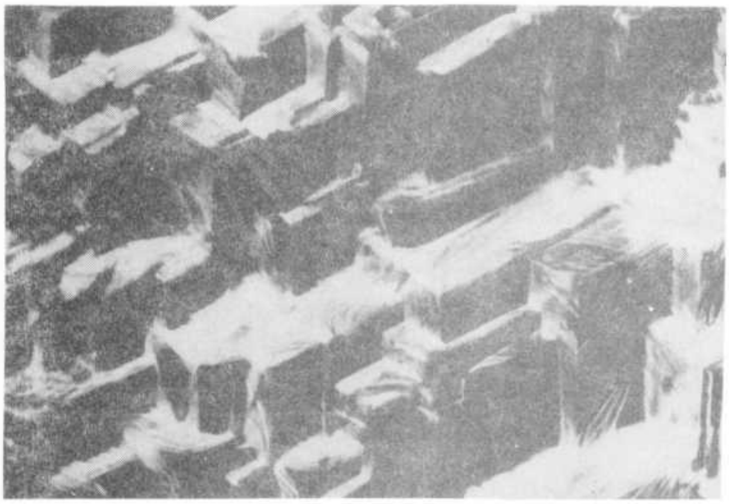


Fig. 6 - Estriación superficial del titanio

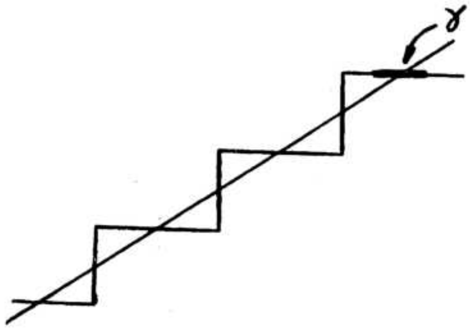


Fig. 7
Preferencia en la formación de planos de bajo índice por razones de energía superficial

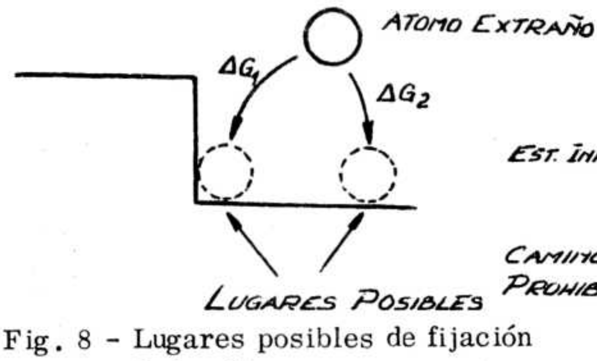


Fig. 8 - Lugares posibles de fijación de los átomos y sus correspondientes variaciones de ΔG.

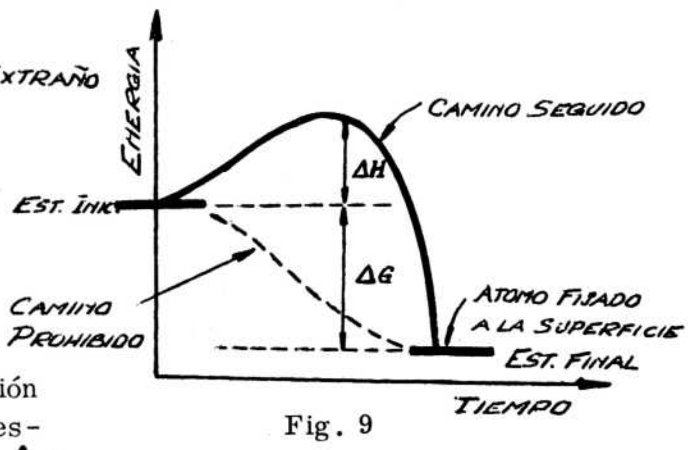


Fig. 9

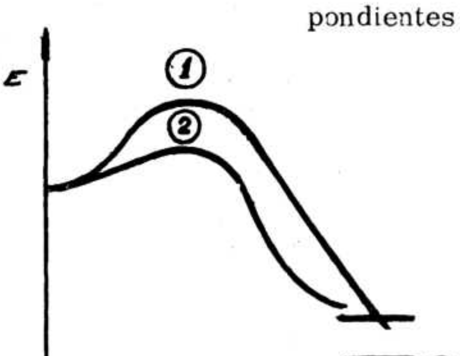


Fig. 9 - a)

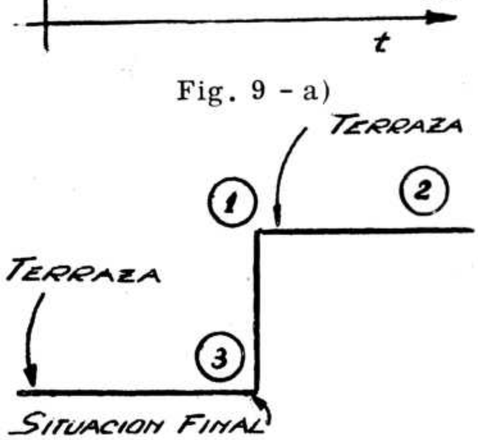


Fig. 10 - Estados transitorios (1) y (2) y final (3)

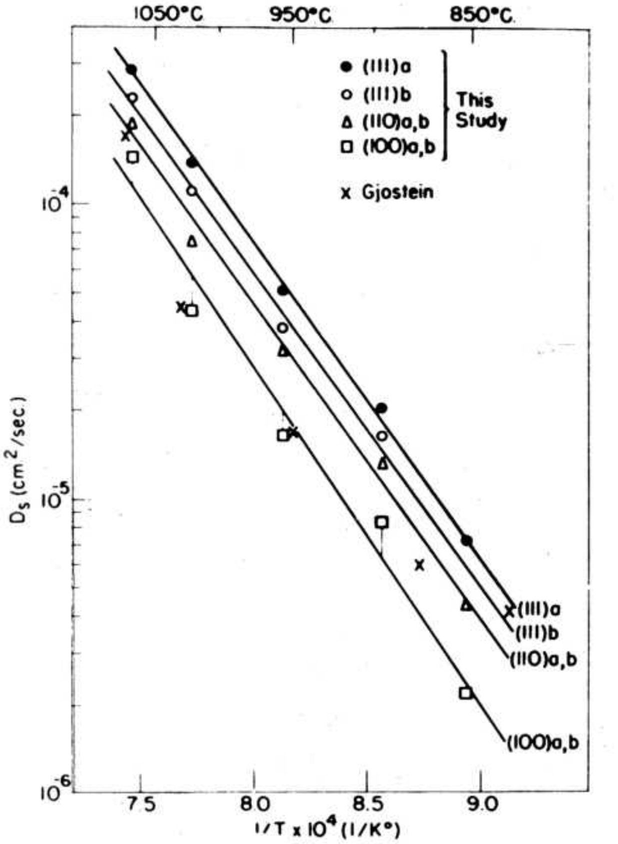


Fig. 10 - a) Difusión superficial en función de la orientación cristalina

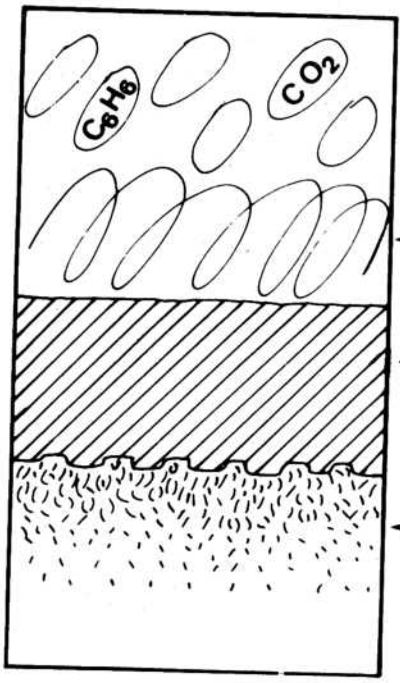


Fig. 11
Superficie calificada de "limpia" por ciertos metalurgistas

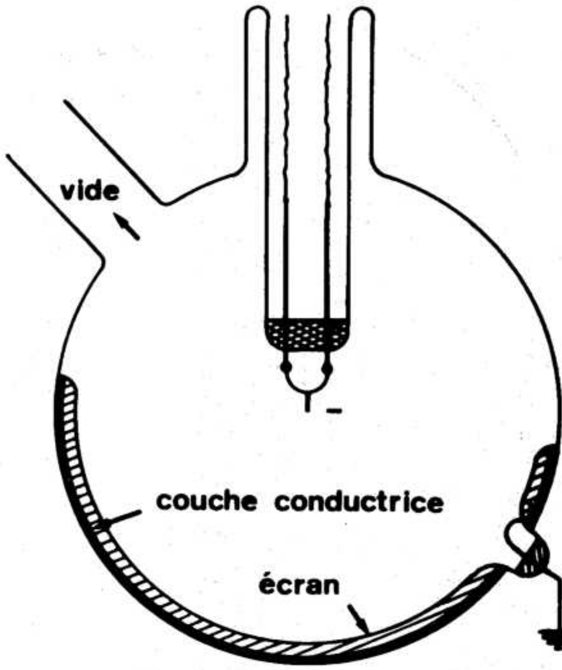


Fig. 12 - a)
Esquema de funcionamiento del microscopio de emisión de campo (electrones) (Müller)

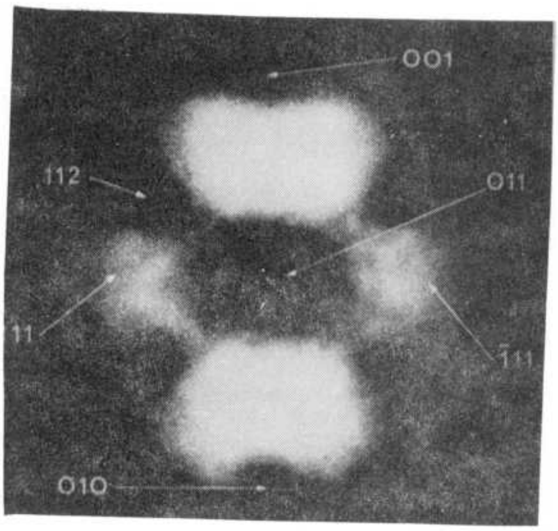


Fig. 12 - b)
Diagrama de emisión de un monocristal de W

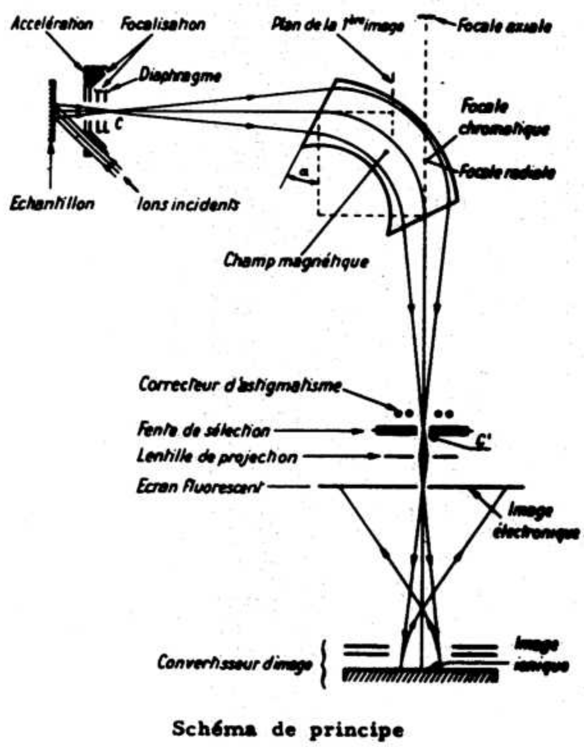


Schéma de principe

Fig. 13

Esquema de funcionamiento del microscopio a emisión de campo (iones)

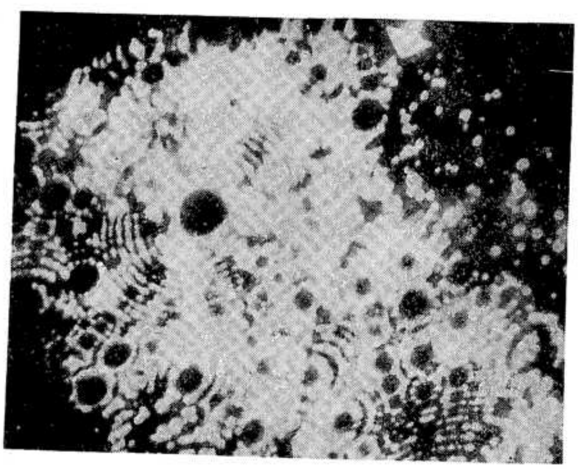


Fig. 14 - Límite de grano por microscopía de emisión iónica en un bicristal.

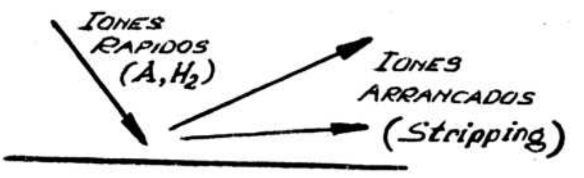


Fig. 15
Principio de la emisión iónica secundaria

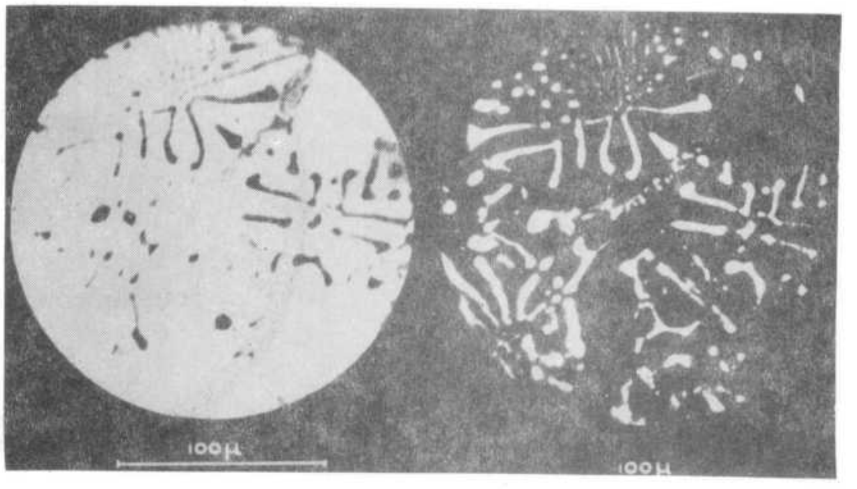


Fig. 16
Microscopía de emisón iónica secundaria de una aleación Al-Mg-Si
Las imágenes son obtenidas por isótpos Mg^{24} y Al^{27}

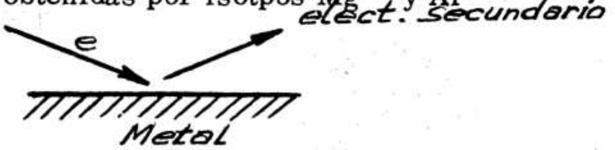


Fig. 17 - Principio de la espectroscopía Auger

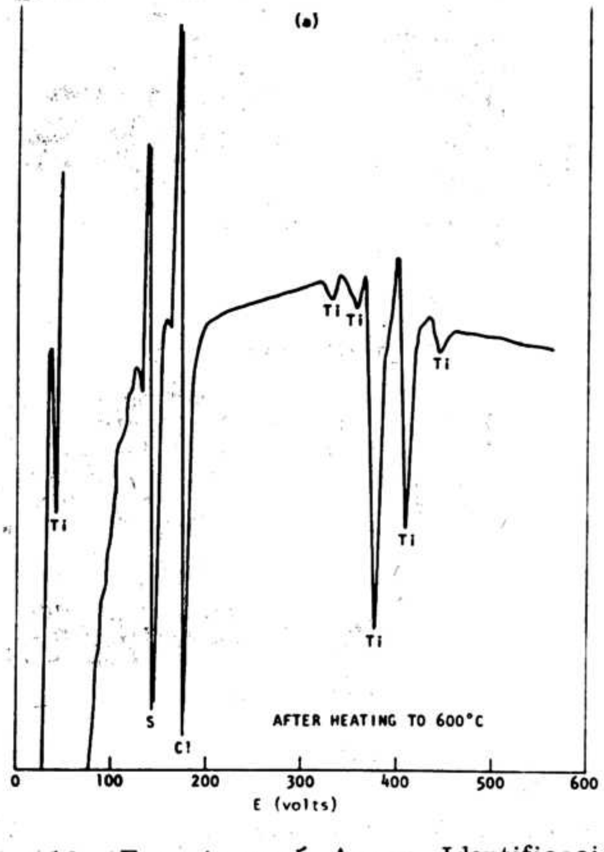


Fig. 18 - Espectroscoía Auger. Identificación de las impurezas S y C en titanio

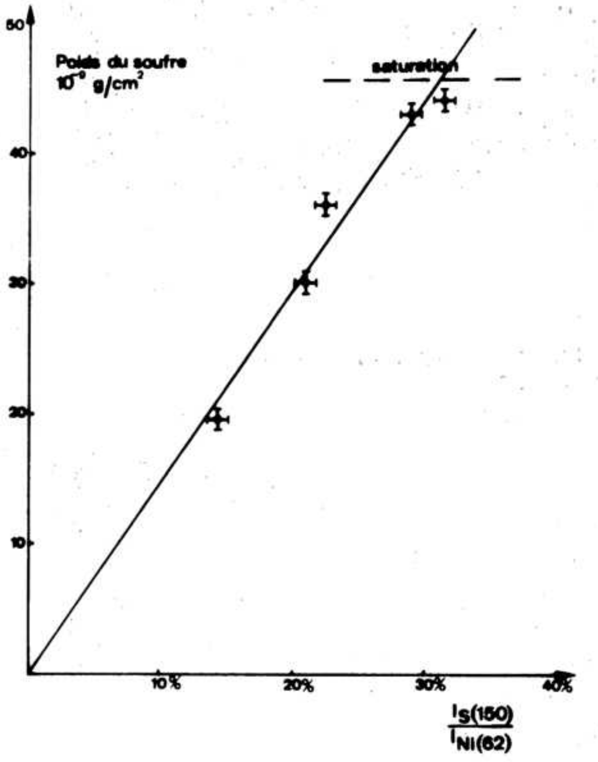


Fig. 19 - Curva de contraste de los picos Auger del azufre radioactivo en Ni

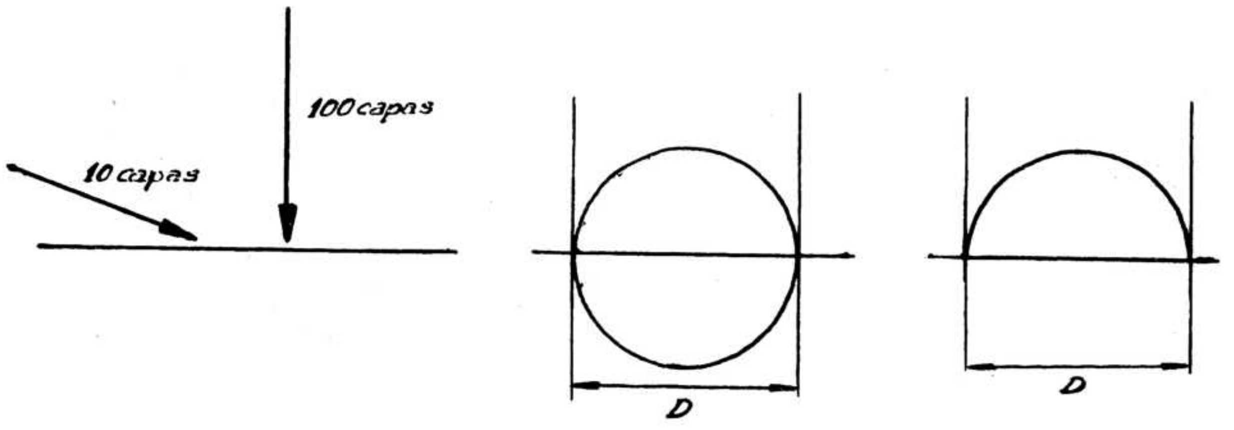


Fig. 20
Principio de funcionamiento del método de electrones rápidos y las órdenes de penetración en función de inclusión del haz de electrones

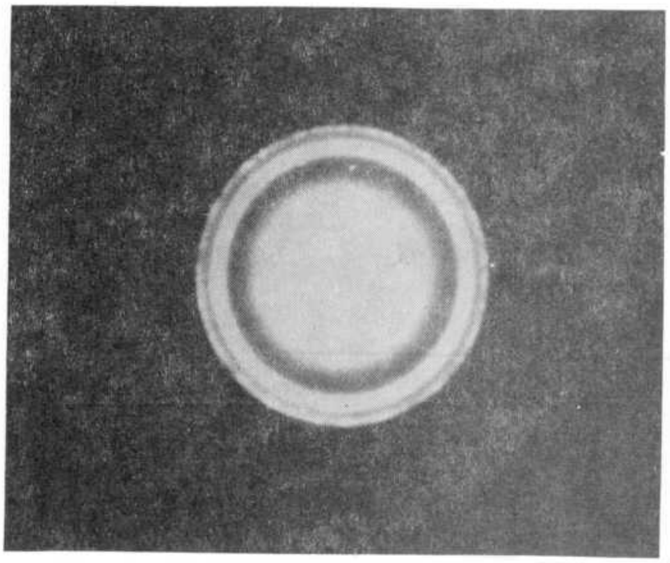


Fig. 20 - a) Diagrama de difracción de un policristal

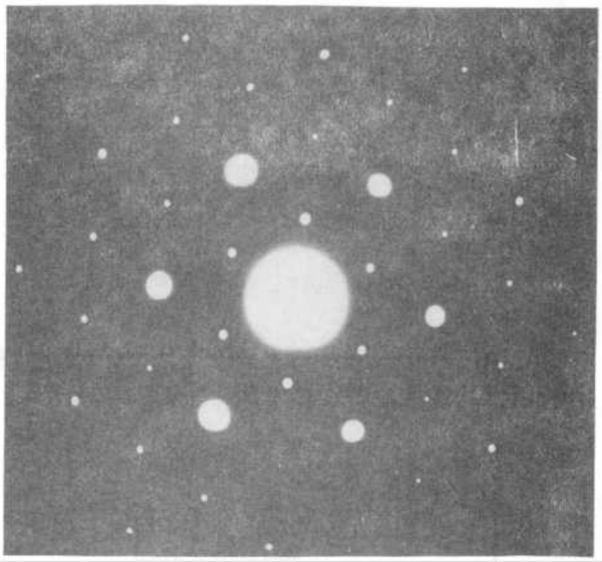


Fig. 20 - b) Monocristal

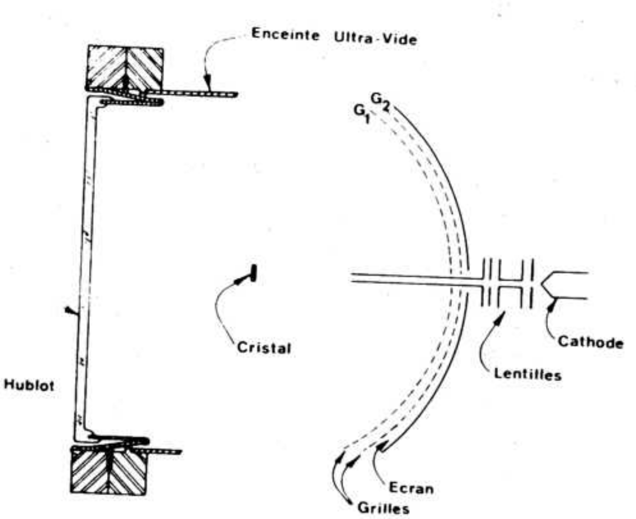


Fig. 21 - Esquema del aparato de difracción de electrones lentos

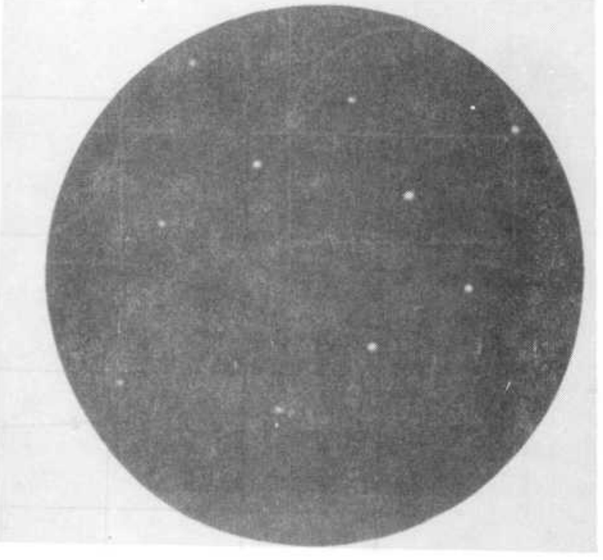


Fig. 21 - a) Diagrama de difracción de electrones lentos del Cu según eje binario (100 Volts)

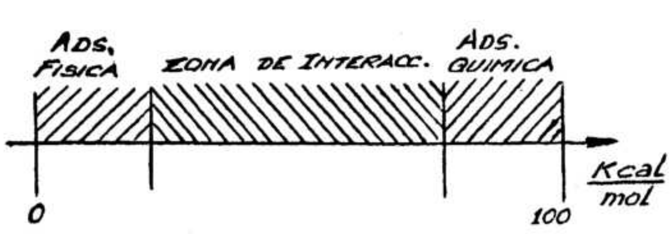


Fig. 22

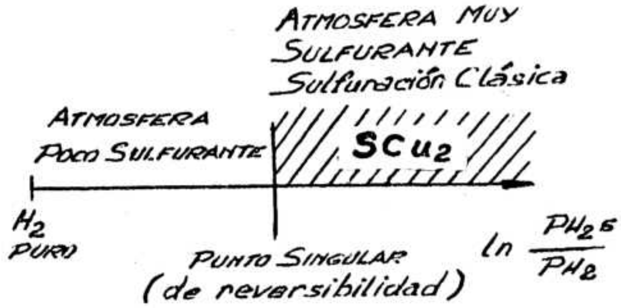


Fig. 23

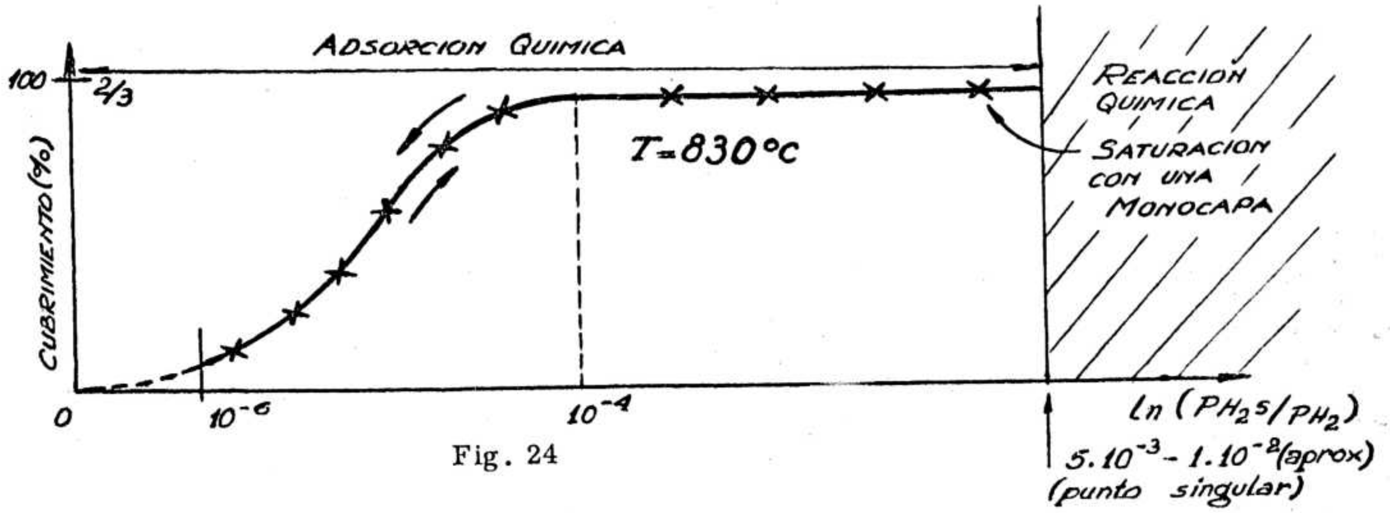


Fig. 24

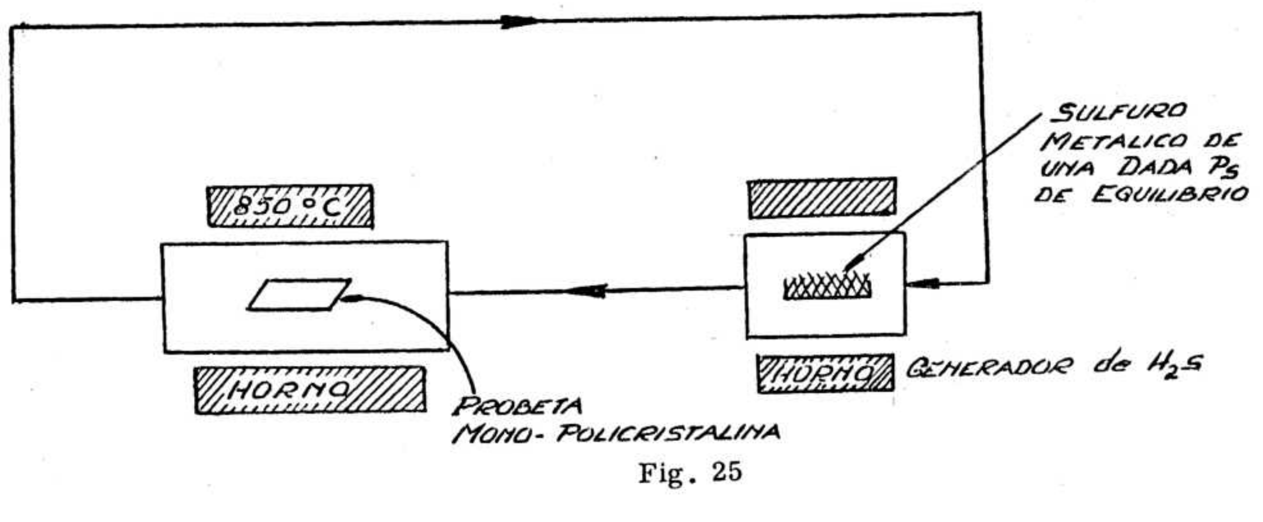


Fig. 25

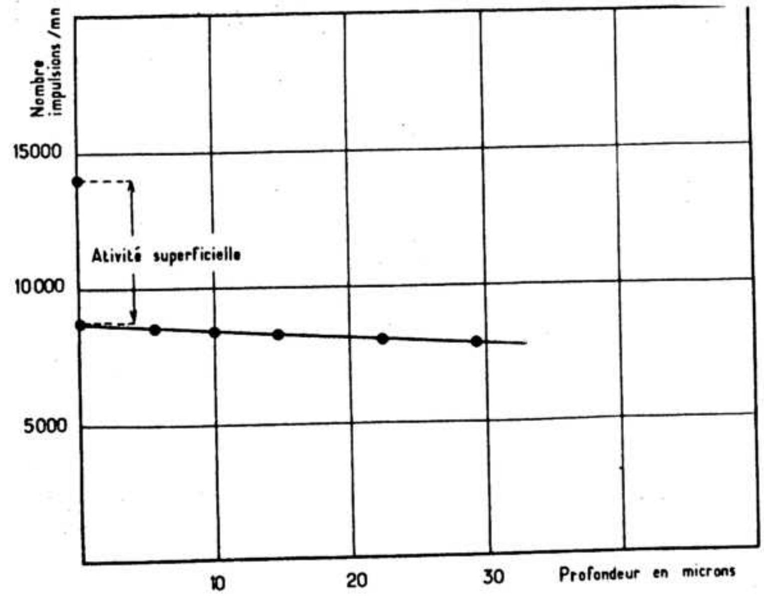


Fig. 26

Distribución del S* en la superficie y por debajo de la misma, durante una experiencia de adsorción.

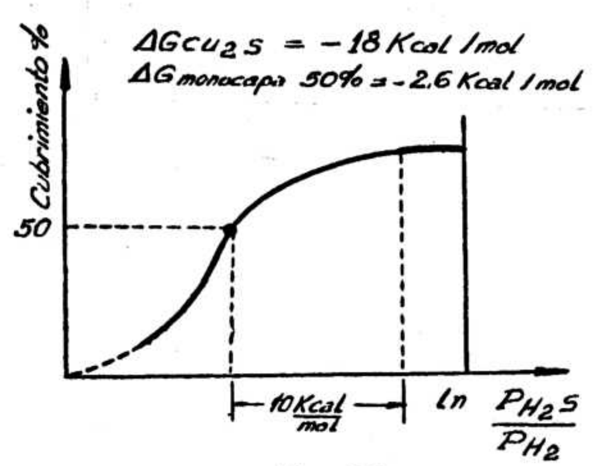


Fig. 27

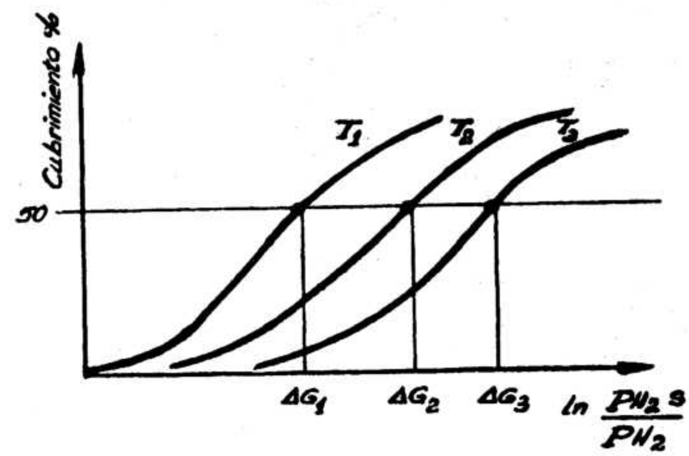
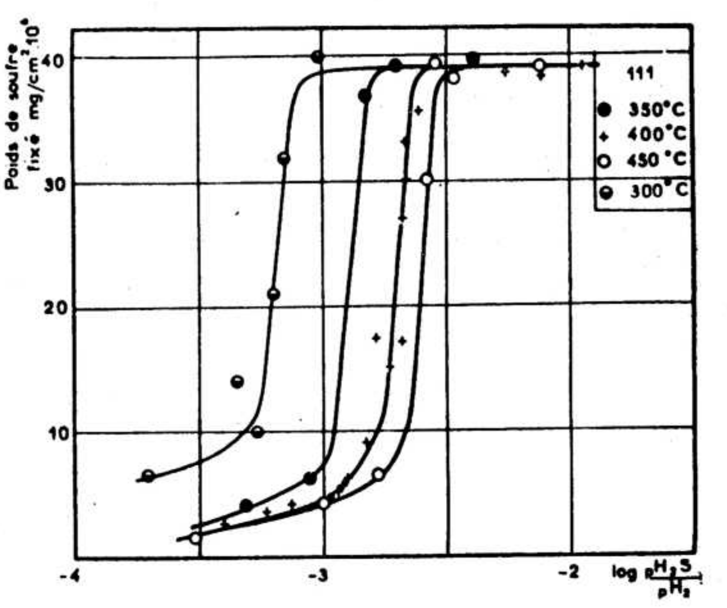


Fig. 28
Valores de **Δ** G para distintas temperaturas a recubrimiento constante

Fig. 29

Isotermas de adsorción del S sobre Ag a distintas temperaturas



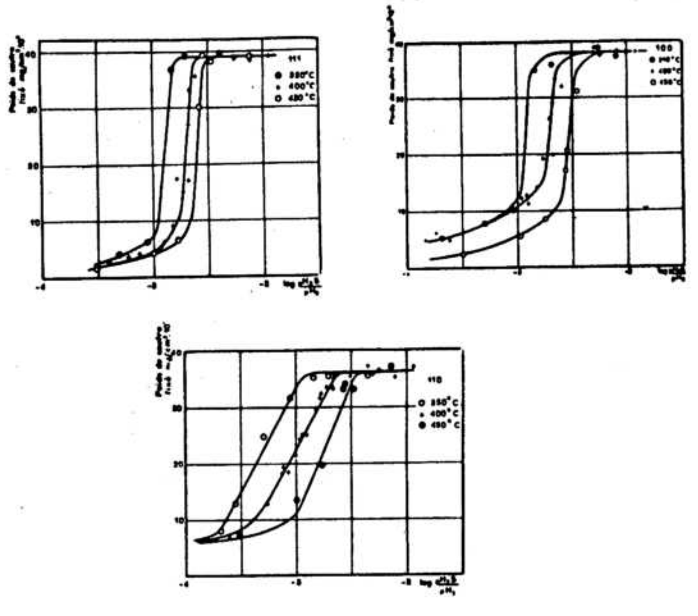


Fig. 30

Isotermas de adsorción sobre las tres caras de índices simples de la plata

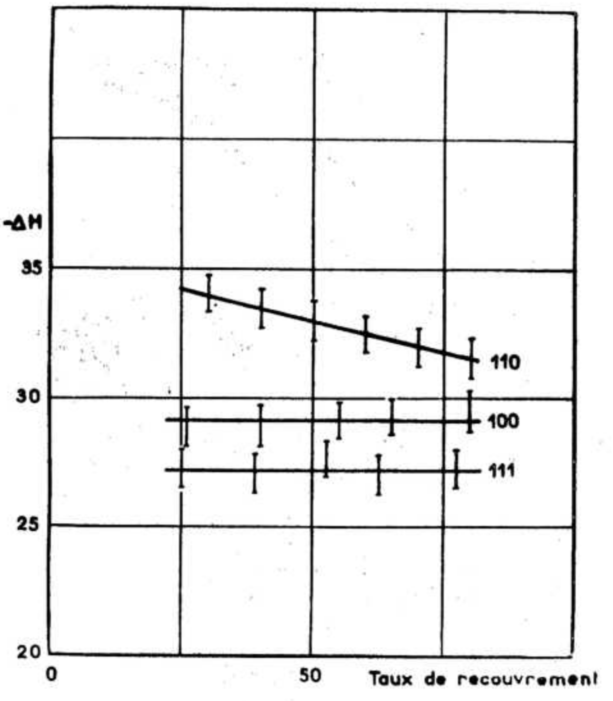


Fig. 31 - Variación del ΔH de adsorción en función del porciento de recubrimiento para planos (111)(100)y(110)

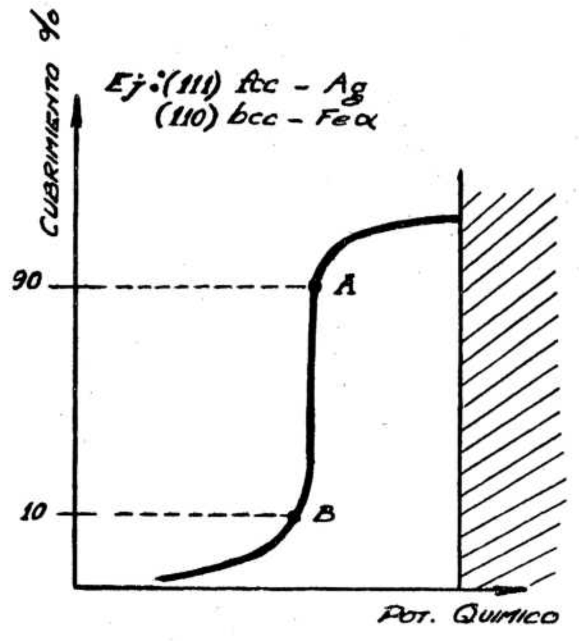


Fig. 32

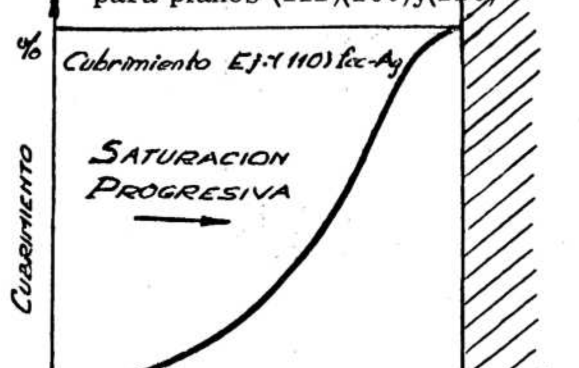


Fig. 33

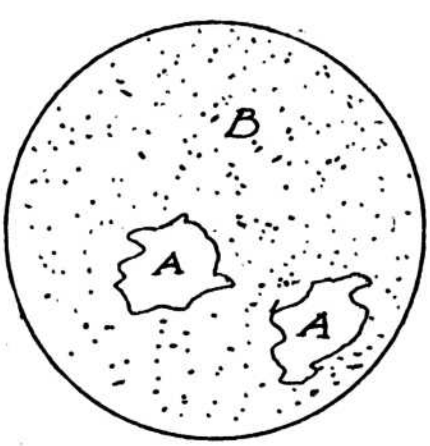


Fig. 34

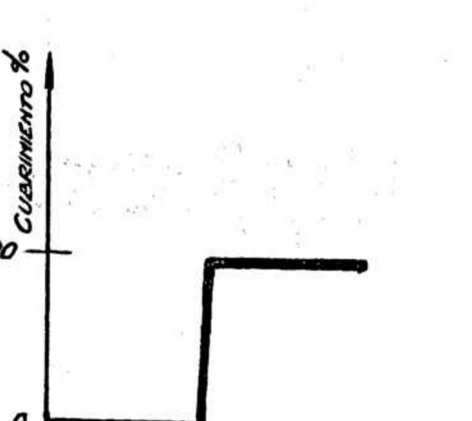


Fig. 35

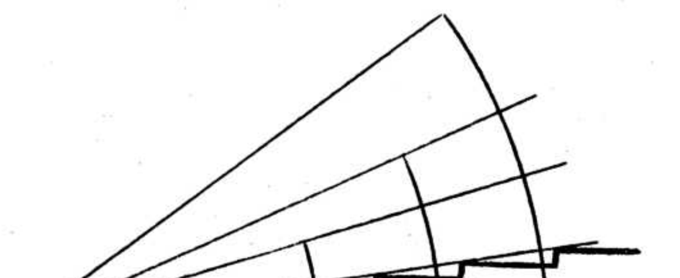


Fig. 36

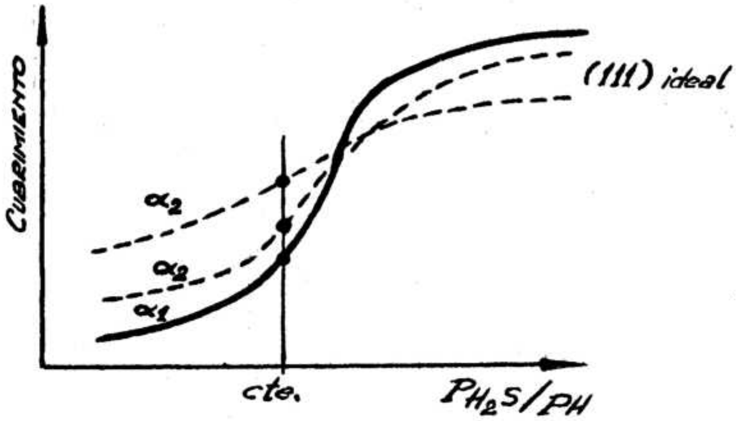


Fig. 37

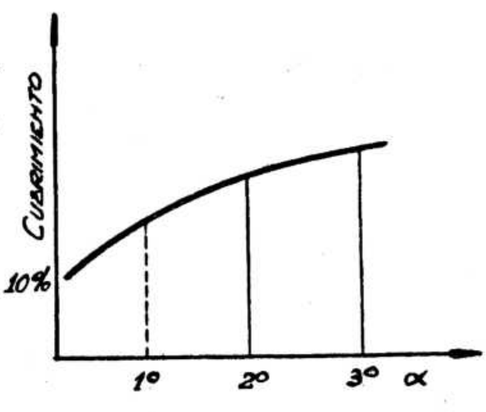


Fig. 38

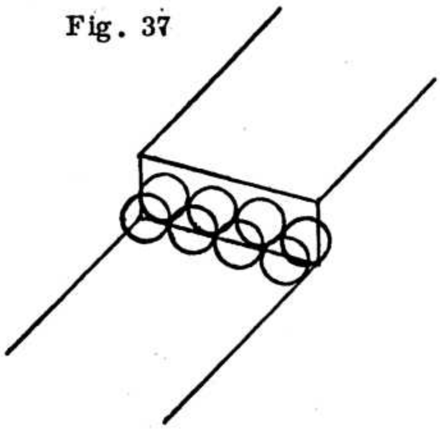


Fig. 39

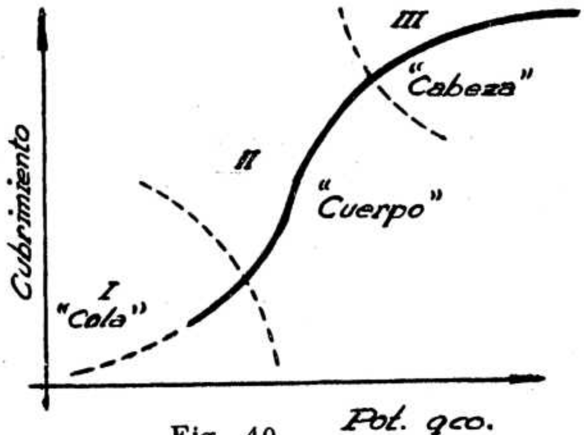


Fig. 40

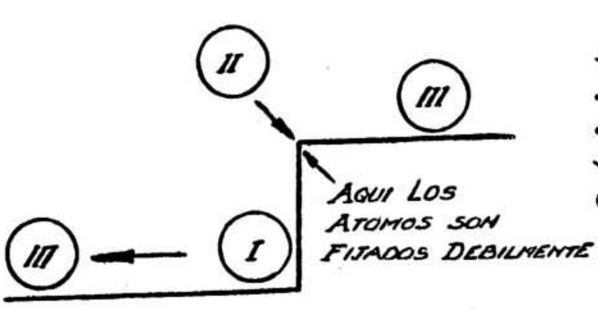


Fig. 41

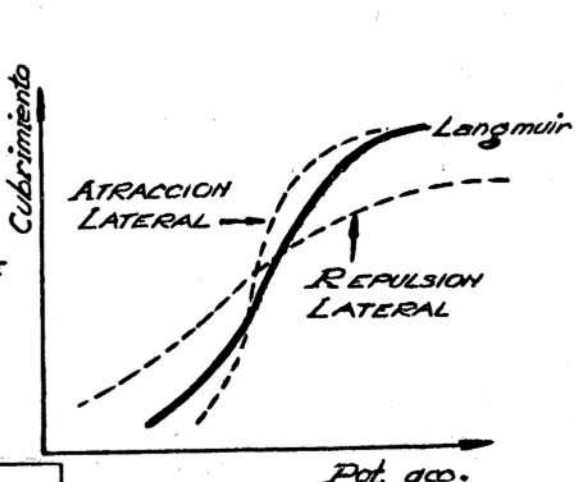


Fig. 42

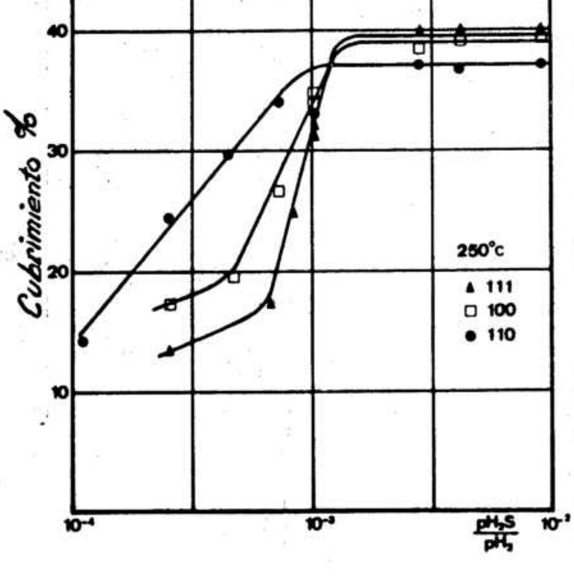


Fig. 43
Isotermas de adsorción reversibles del S sobre Au

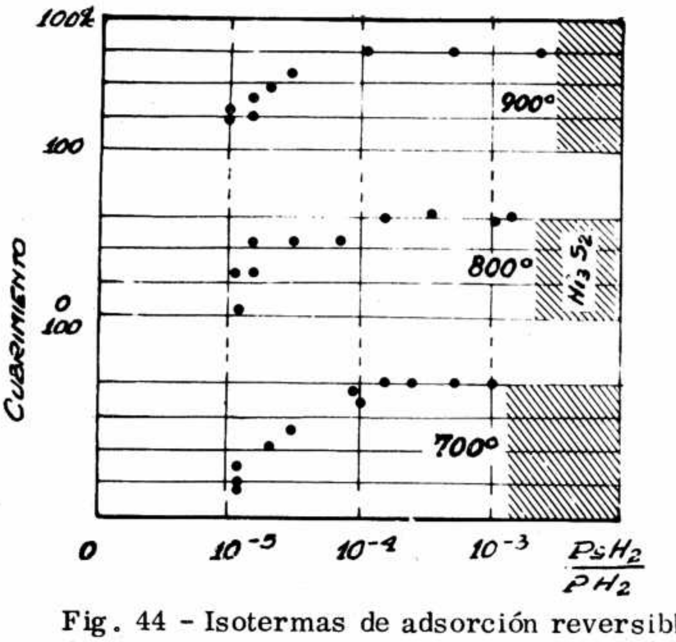


Fig. 44 - Isotermas de adsorción reversibles del S sobre Ni

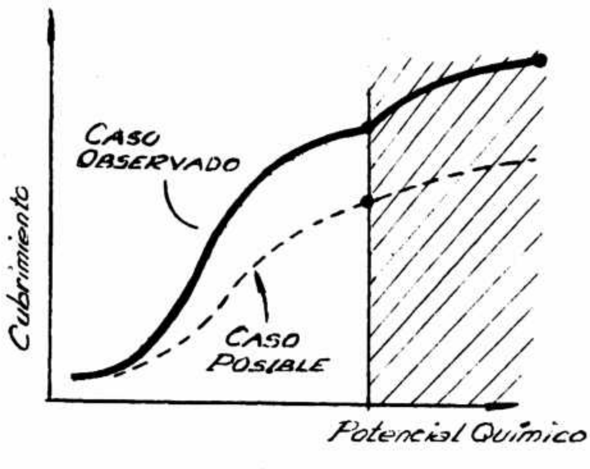


Fig. 45

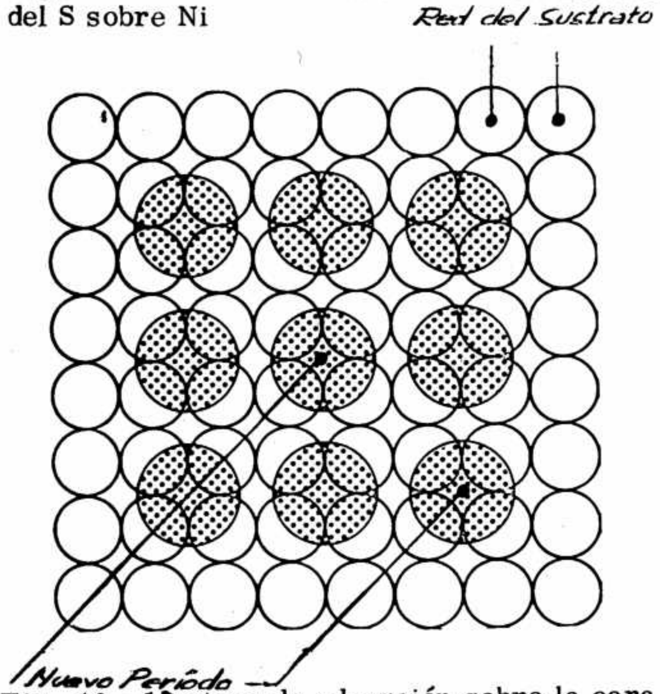


Fig. 46 - 1ª etapa de adsorción sobre la cara (100) de un cristal f.c.c.

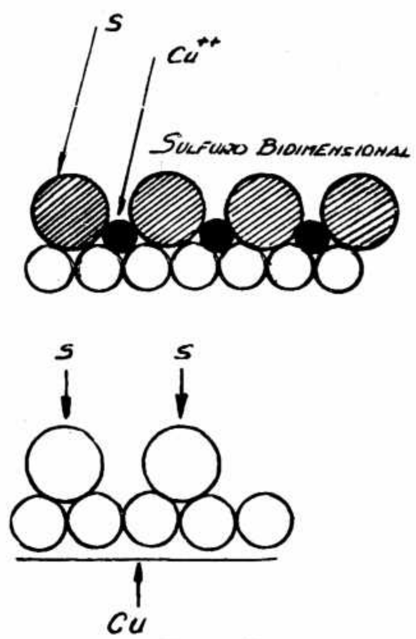


Fig. 47

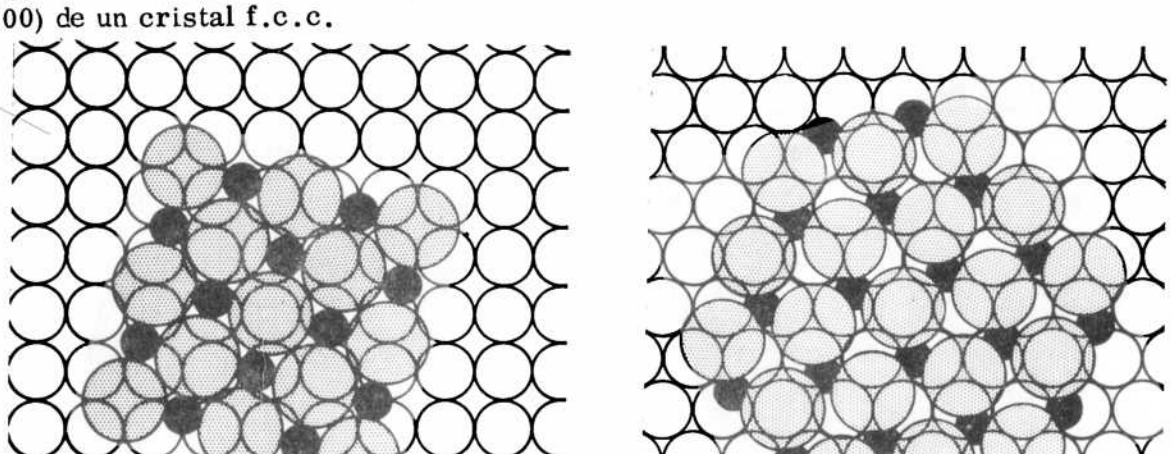


Fig. 48 Segunda etapa de adsorción sobre la cara a) (100) y b) (111) del cobre

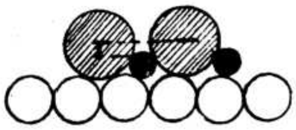


Fig. 49

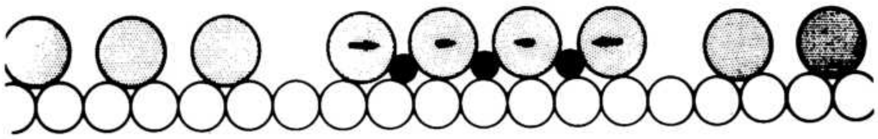


Fig. 50

Posibilidad de la existencia de una **COTA** de separación de los planos de cargas positivas y negativas

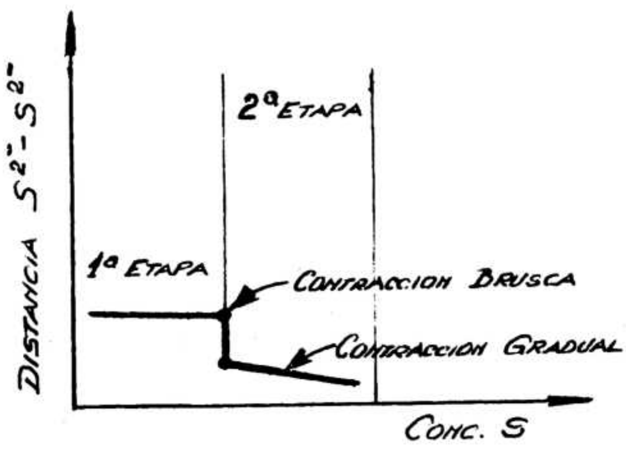


Fig. 50 - a) coexistencia de la 1a. y 2a. etapas de adsorción sobre la misma superficie

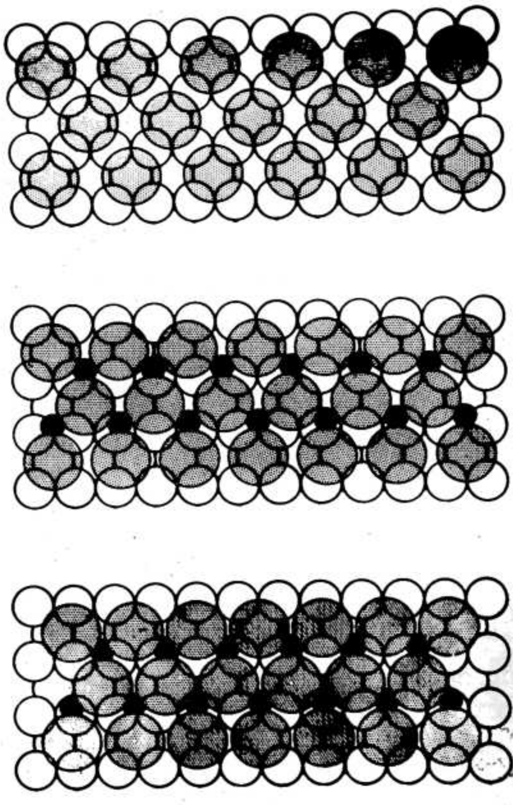


Fig. 50 - b) en (110) Cu

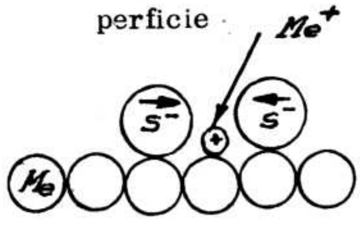


Fig. 52

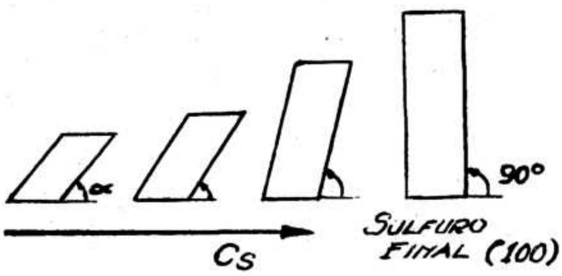


Fig. 53 - 2a. etapa de adsorción en Fe
a) variación del ángulo entre las redes del metal y de la carga adsorbida en función de C_s sobre plano (100)

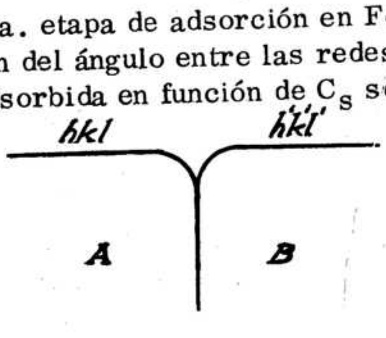


Fig. 54

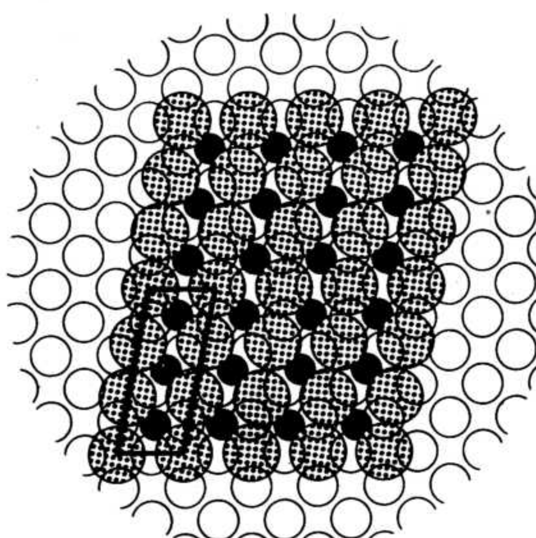


Fig. 53 - b) Construcción para dado valor de C_s

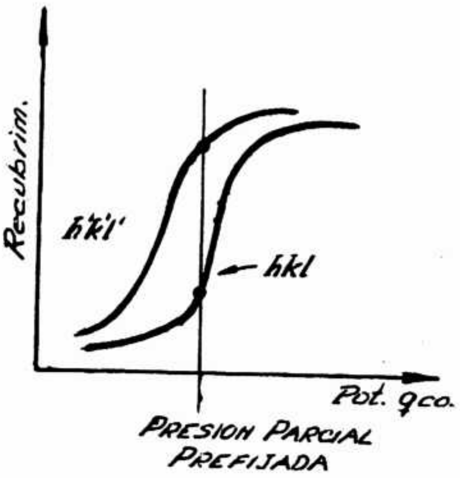


Fig. 55

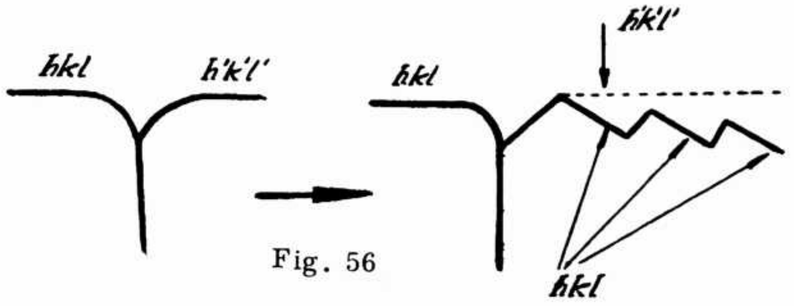


Fig. 56

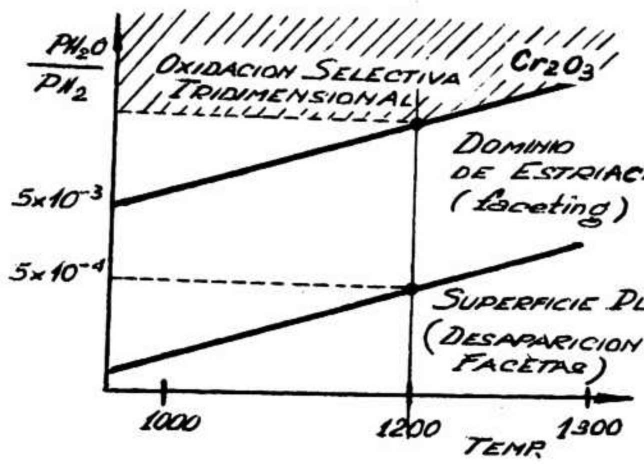


Fig. 57

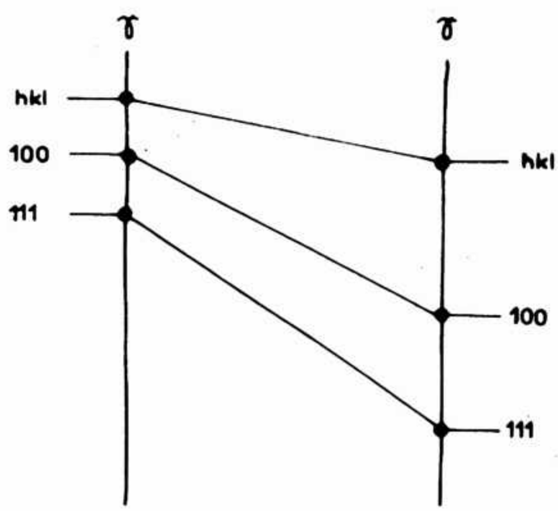


Fig. 58
Disminución selectiva de γ sobre las distintas caras en función de la adsorción selectiva

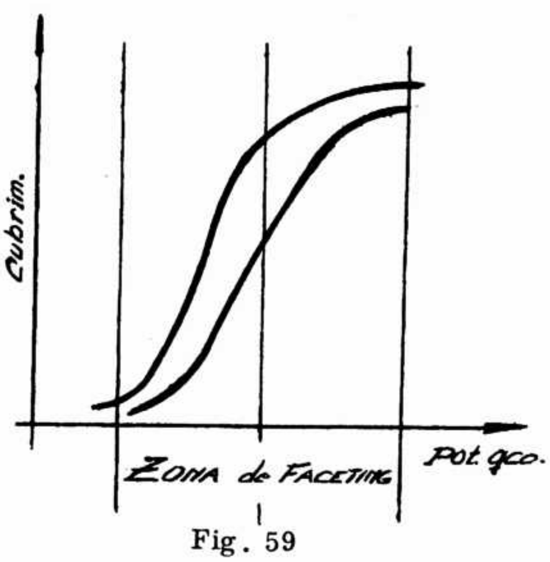


Fig. 59

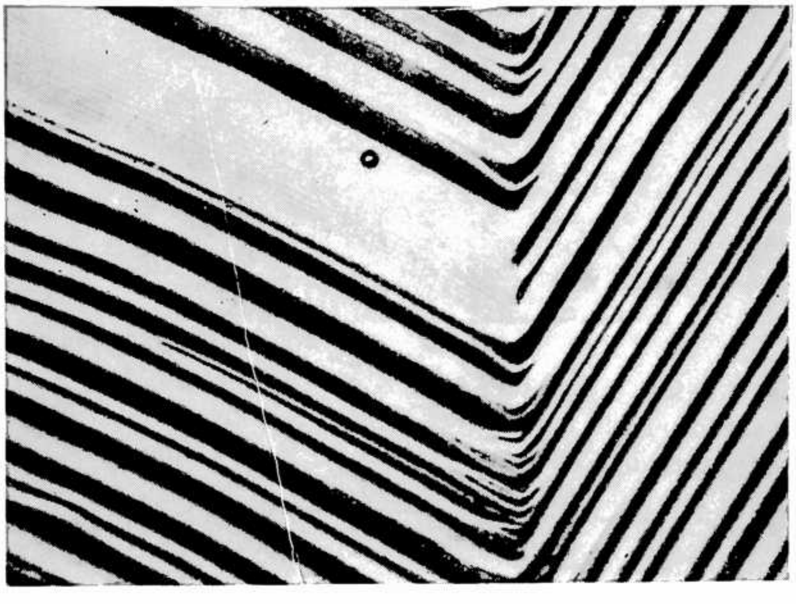


Fig. 60
a) Estructura γ estriada en mezcla H_2O/H_2

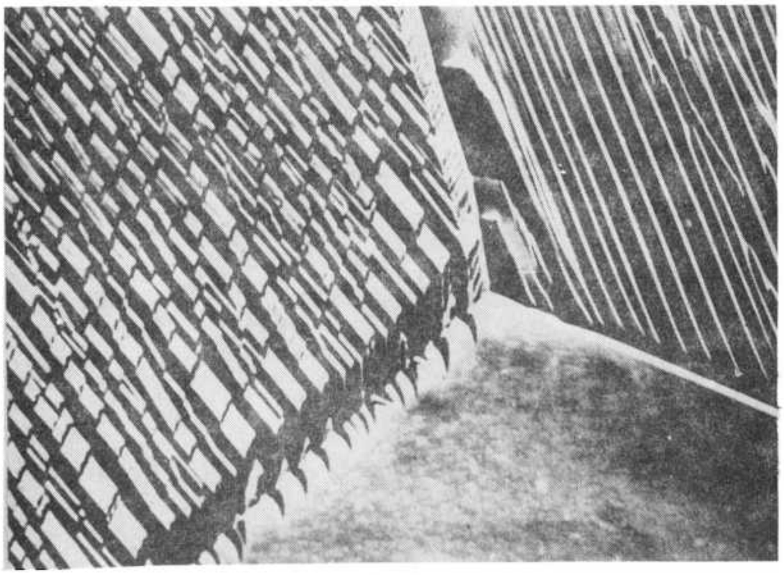


Fig. 60 - b) ídem α

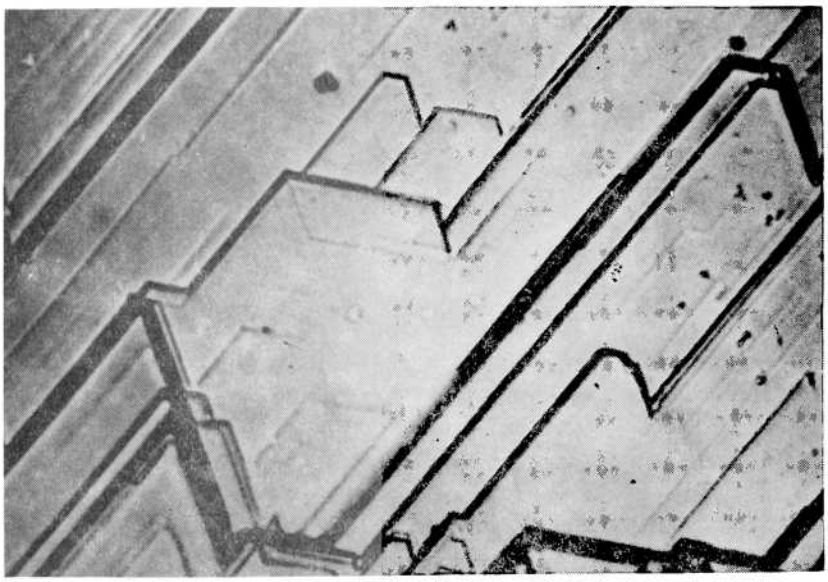


Fig. 60 - c)
Ag estriada por calentamiento en oxígeno

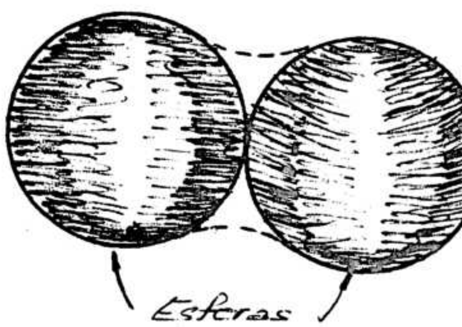


Fig. 61

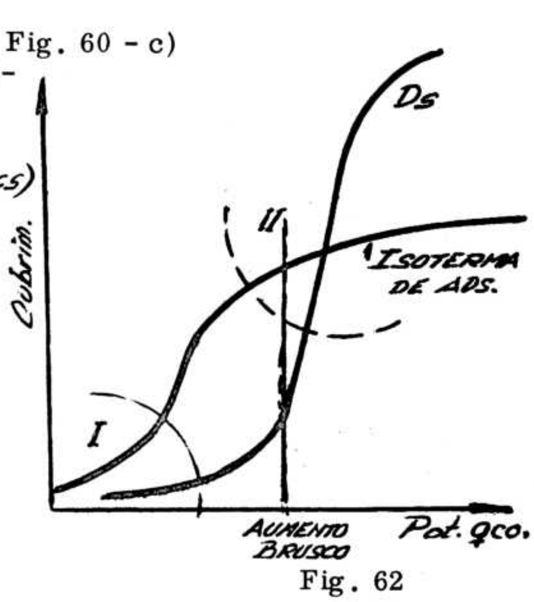


Fig. 62

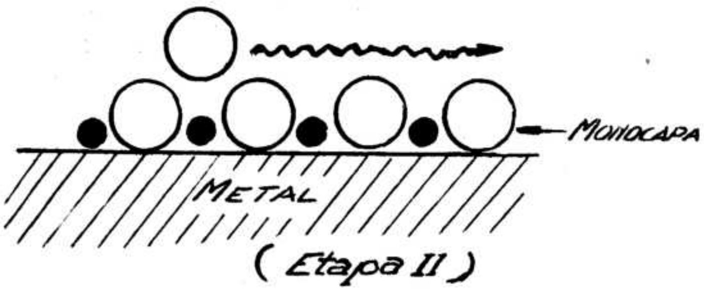


Fig. 63

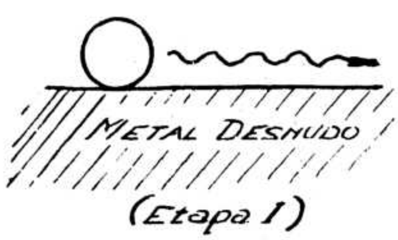


Fig. 64

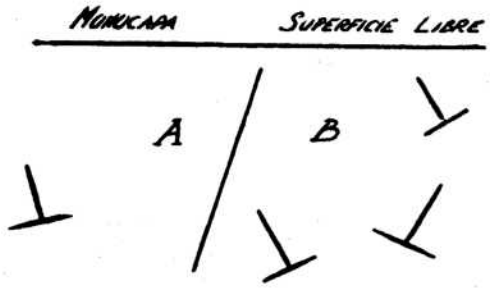


Fig. 65

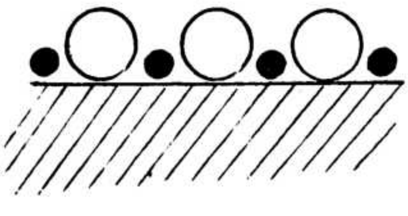


Fig. 66

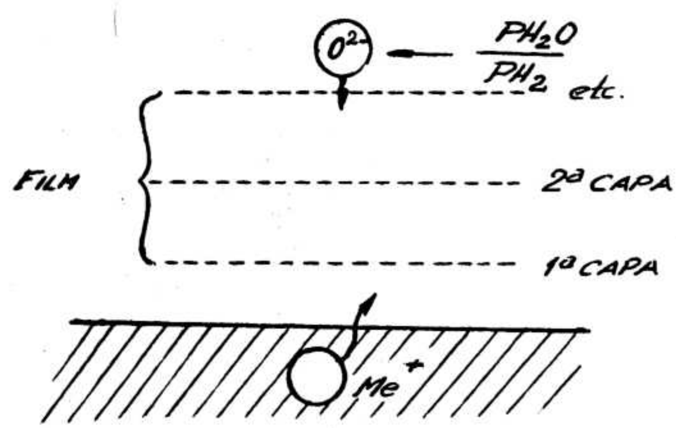


Fig. 67

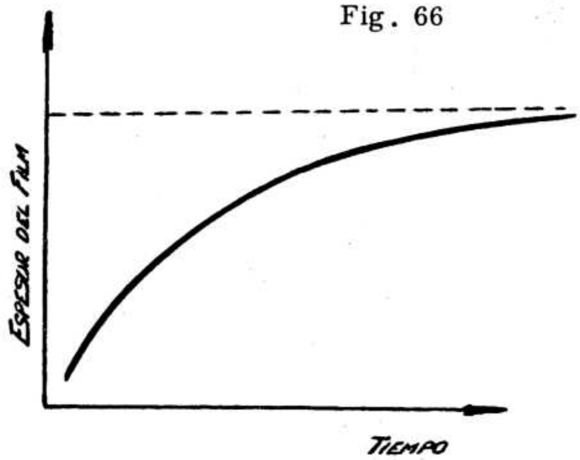


Fig. 68

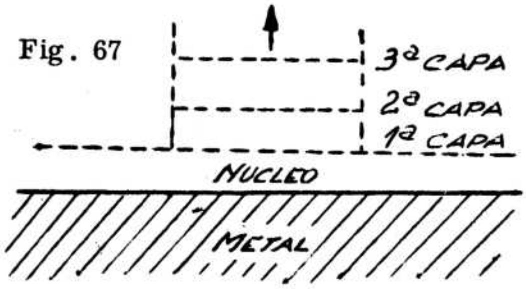


Fig. 69

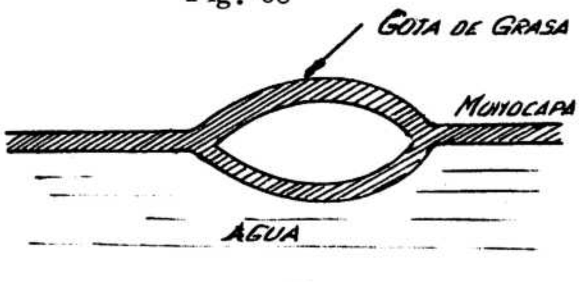


Fig. 70

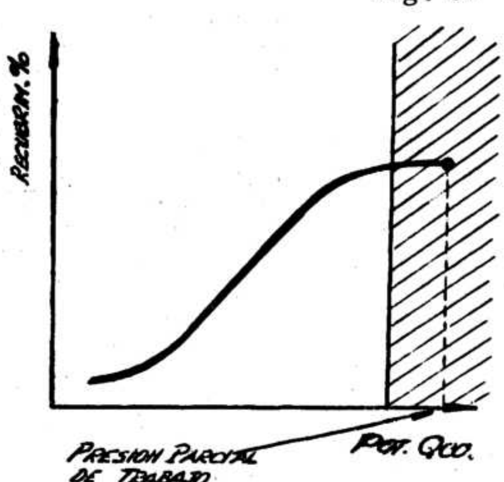


Fig. 71

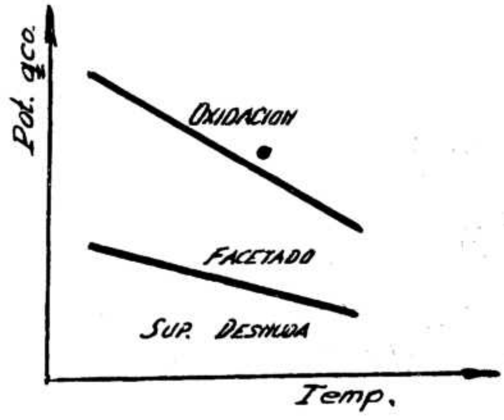


Fig. 72

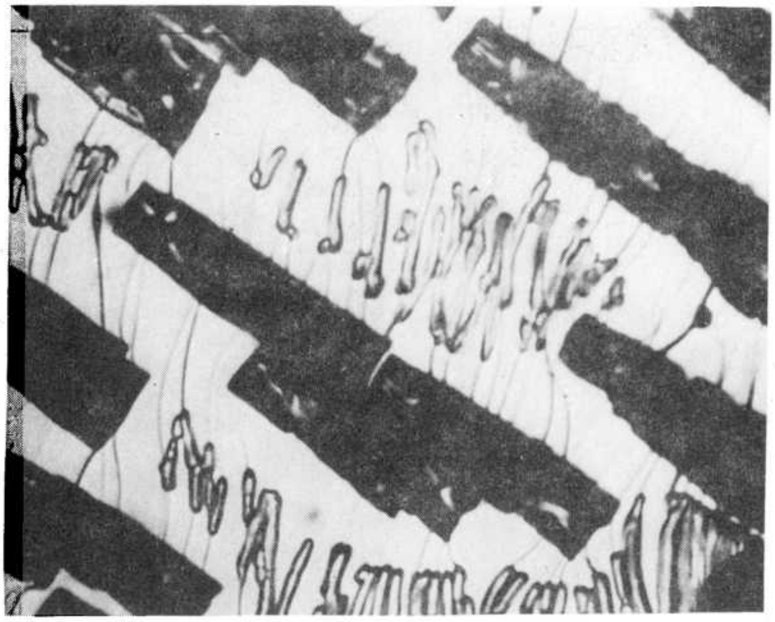


Fig. 73
Nucleación de Cr_2O_3 sobre una aleación Fe-Cr oxidada selectivamente

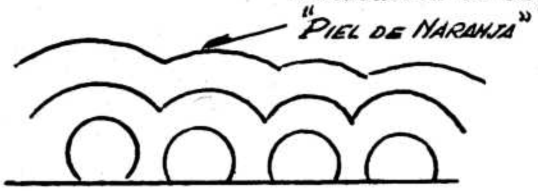


Fig. 74

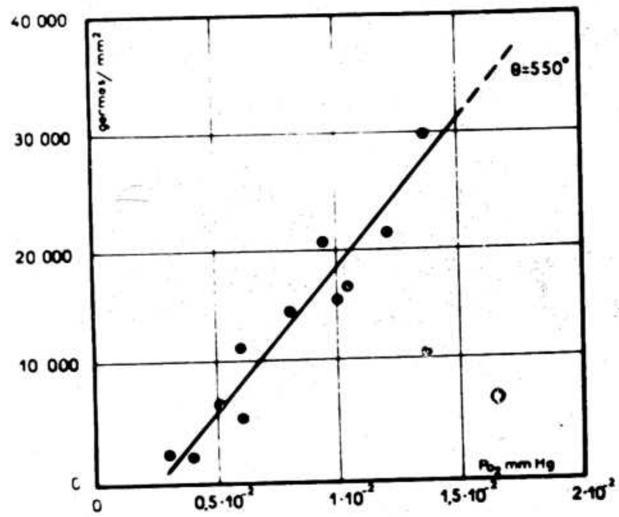


Fig. 75 - Nucleación de Cu_2O sobre Cu. No. de gérmenes en función **de ln** P_O

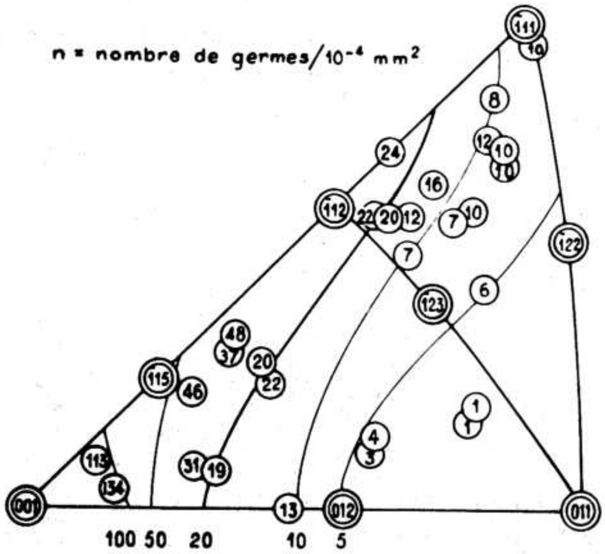


Fig. 76 - Influencia de la orientación sobre la nucleación del FeO sobre Fe α (Bardolle)

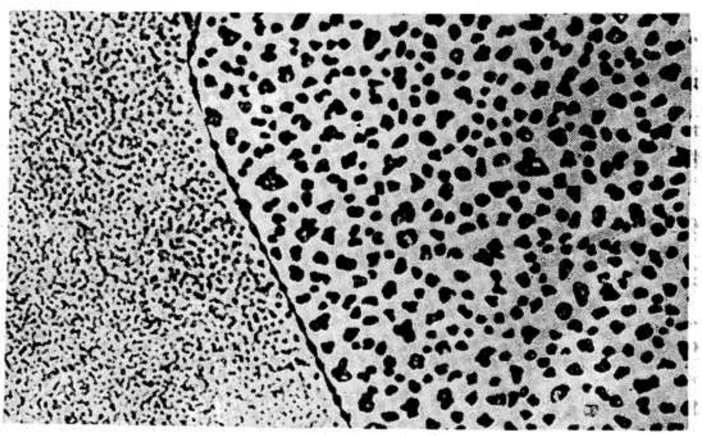


Fig. 77 - Nucleación de FeO sobre Fe α

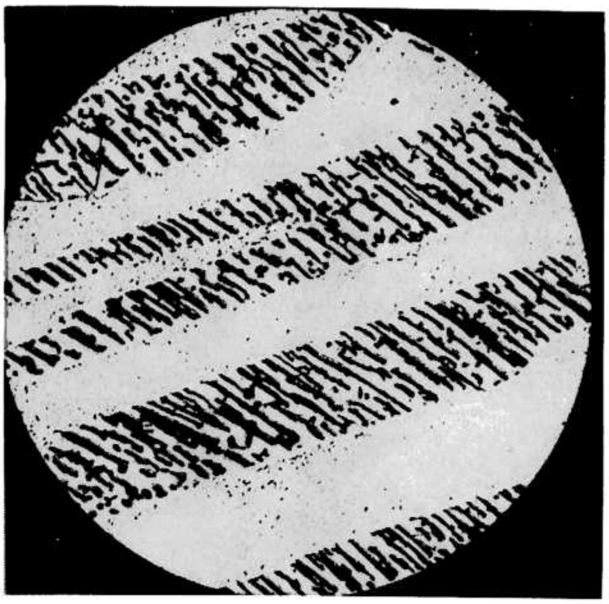


Fig. 78 - Nucleación de Fe O sobre Feα

Fig. 79 - Nucleación de Cu_2O sobre cara (111) del Cu

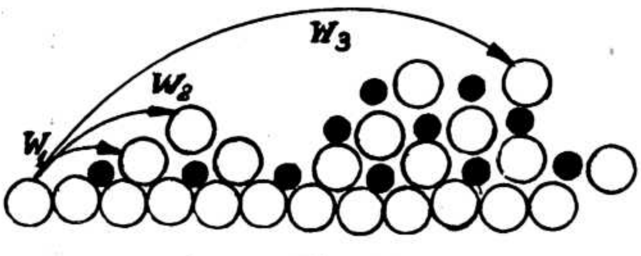


Fig. 80

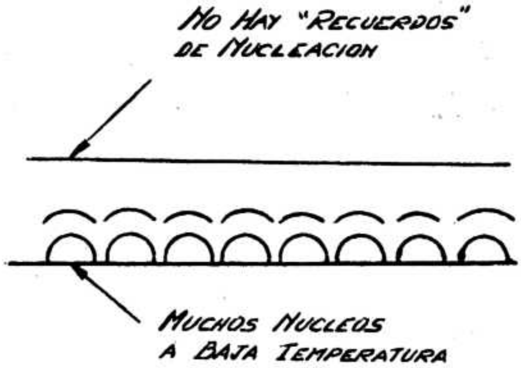


Fig. 81

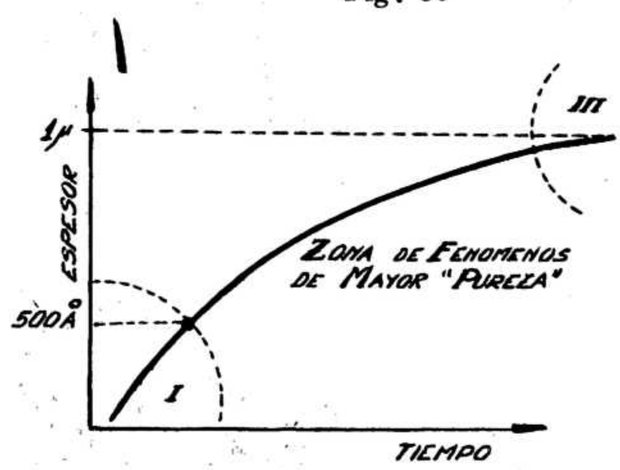


Fig. 82

Fig. 83

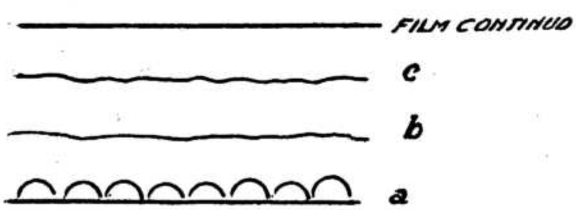


Fig. 84

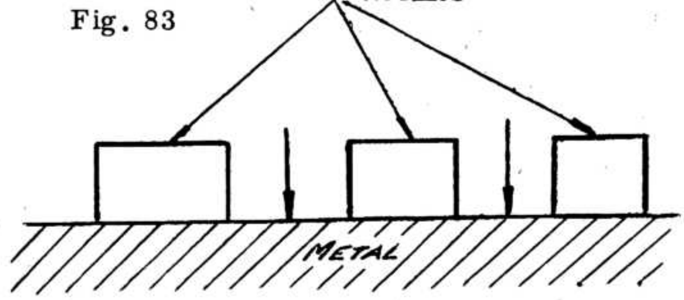


Fig. 85

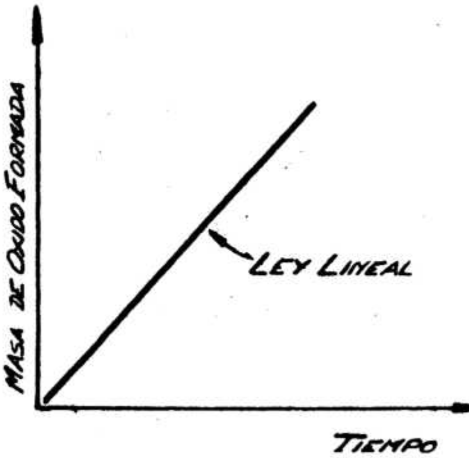


Fig. 86

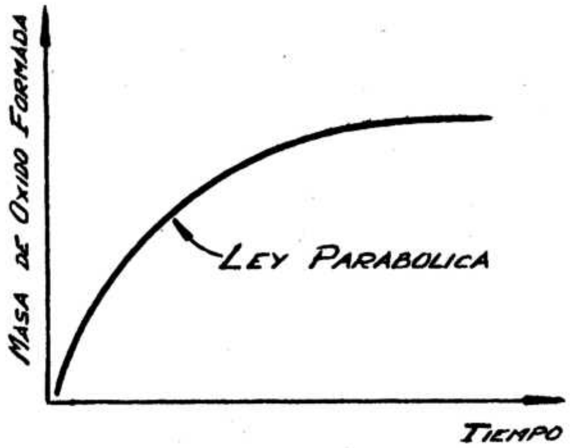


Fig. 87

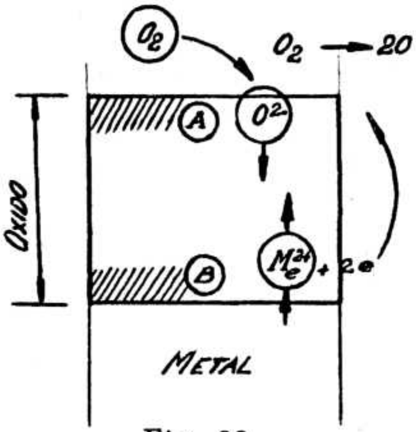


Fig. 88

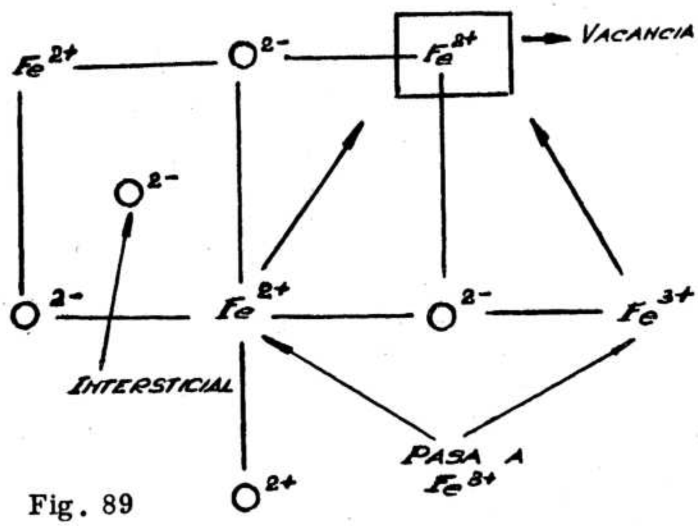


Fig. 89

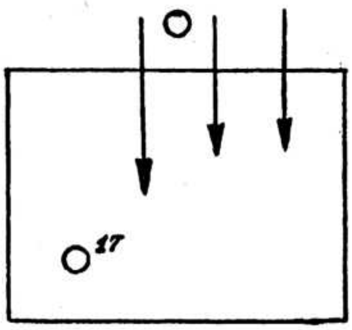


Fig. 90

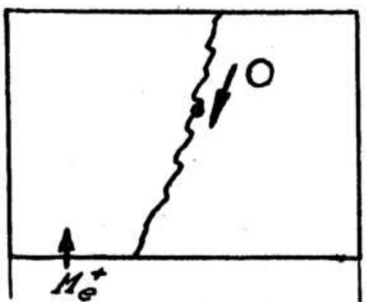


Fig. 91

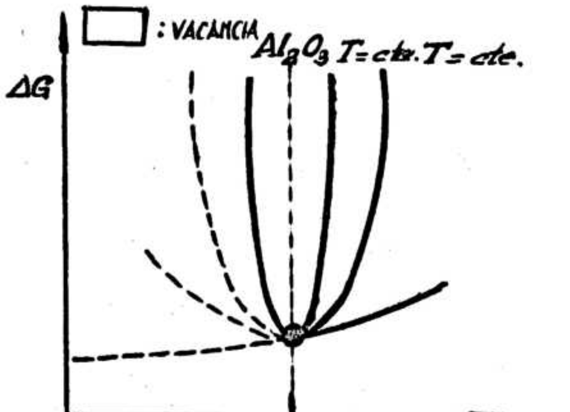


Fig. 92

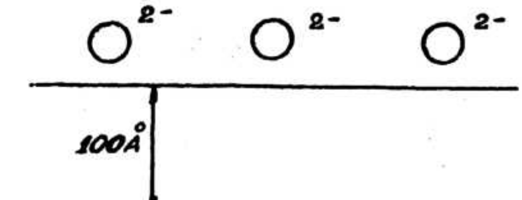


Fig. 93

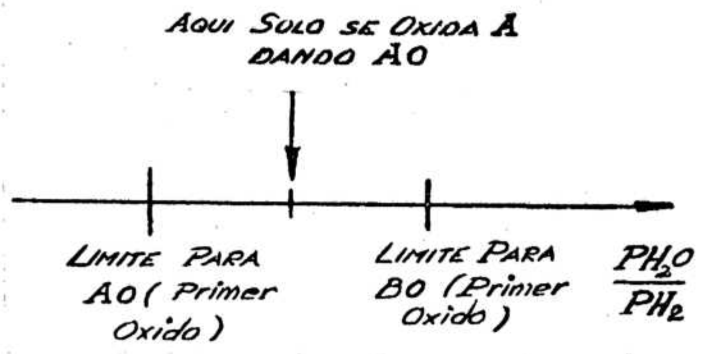


Fig. 94

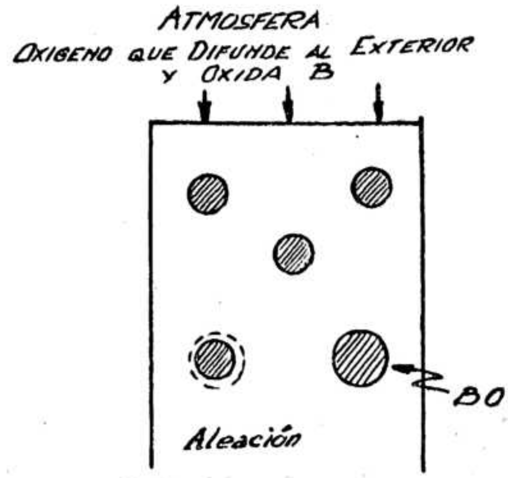


Fig. 95

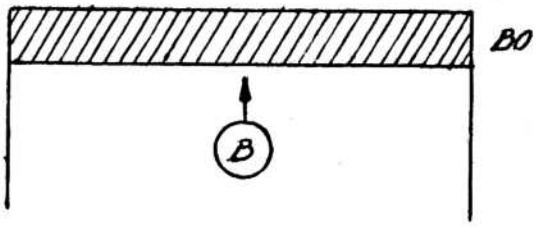


Fig. 96

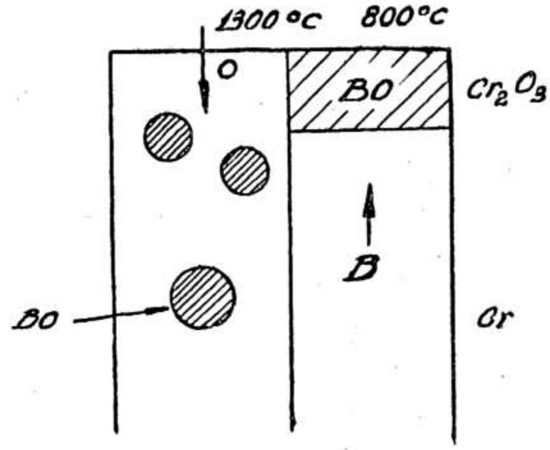


Fig. 97

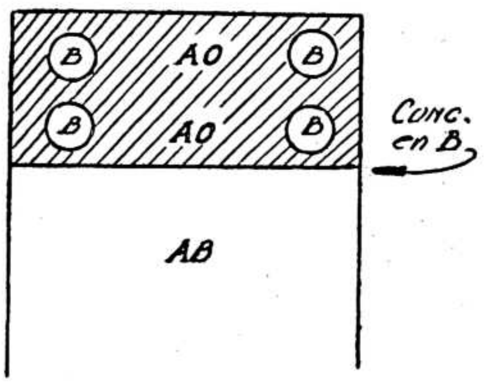


Fig. 98

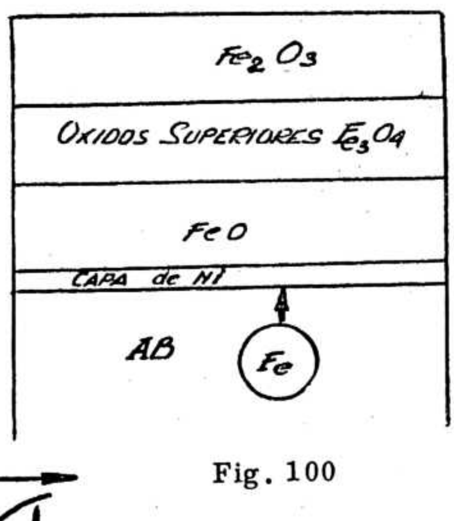


Fig. 100

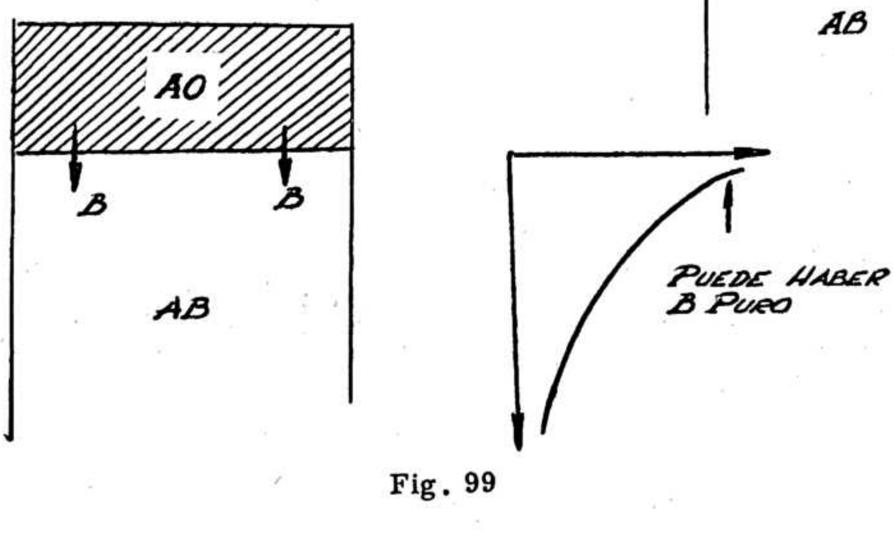


Fig. 99

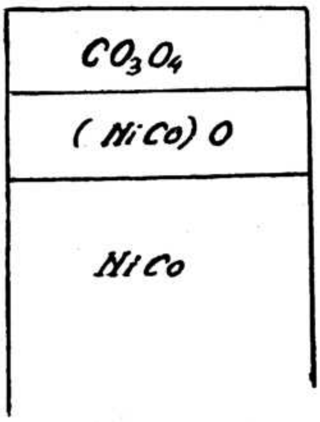


Fig. 101

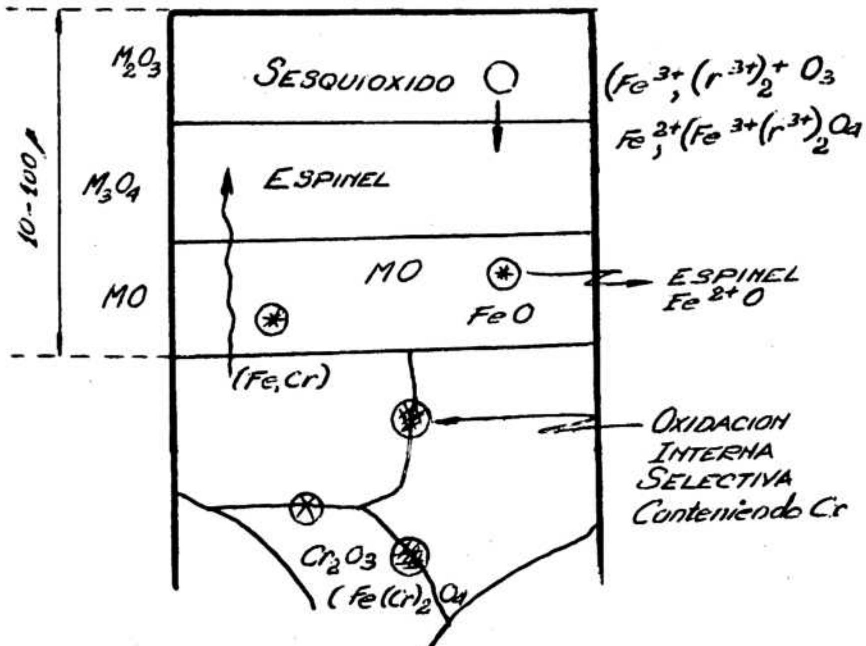


Fig. 102

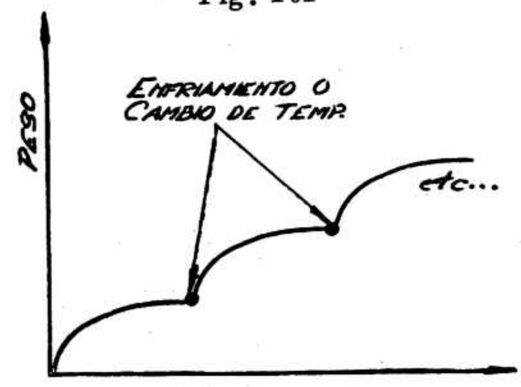


Fig. 103

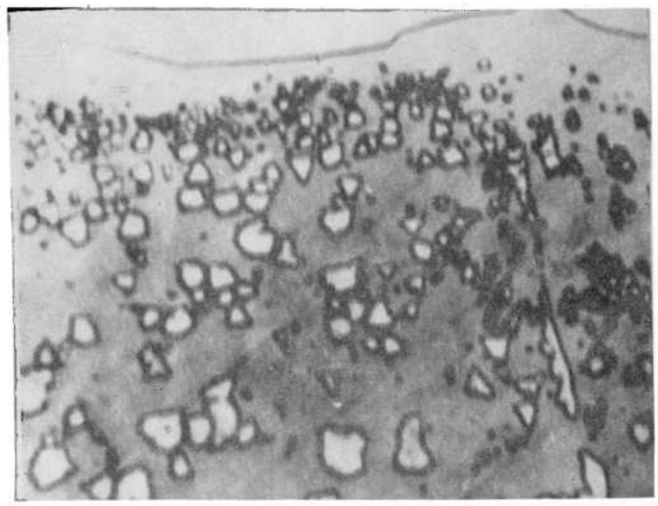


Fig. 104

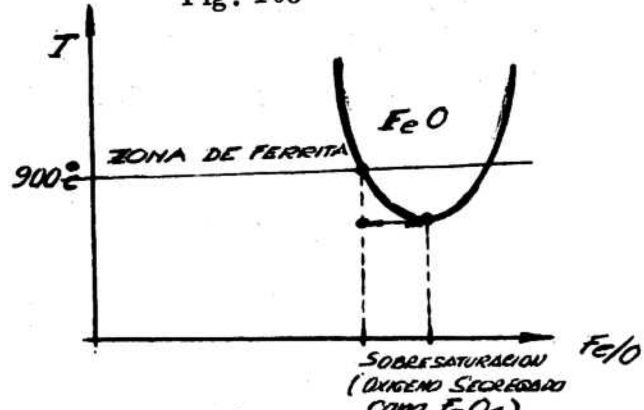


Fig. 105

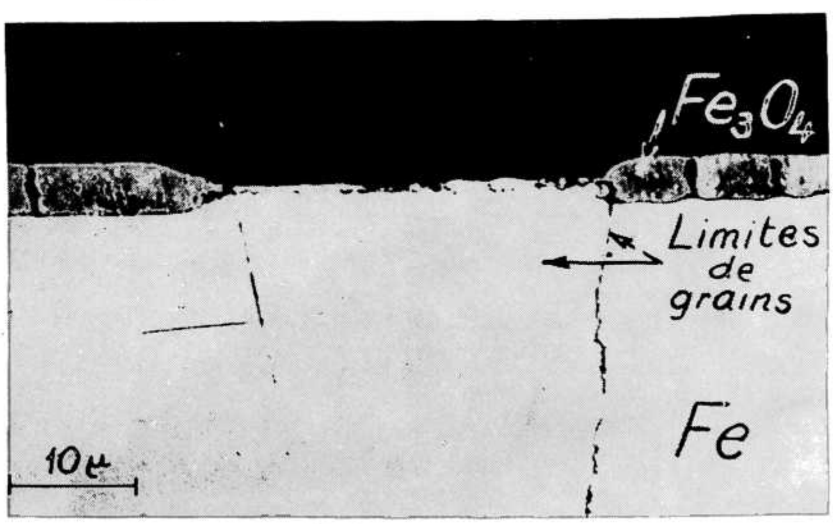


Fig. 106

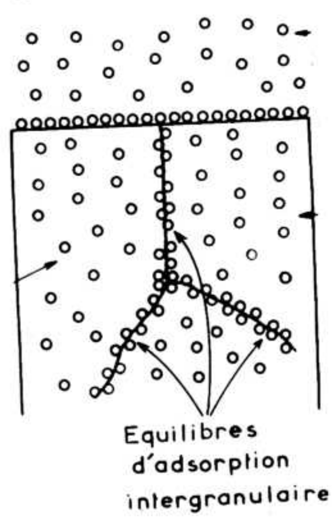


Fig. 107