電子顯微鏡學

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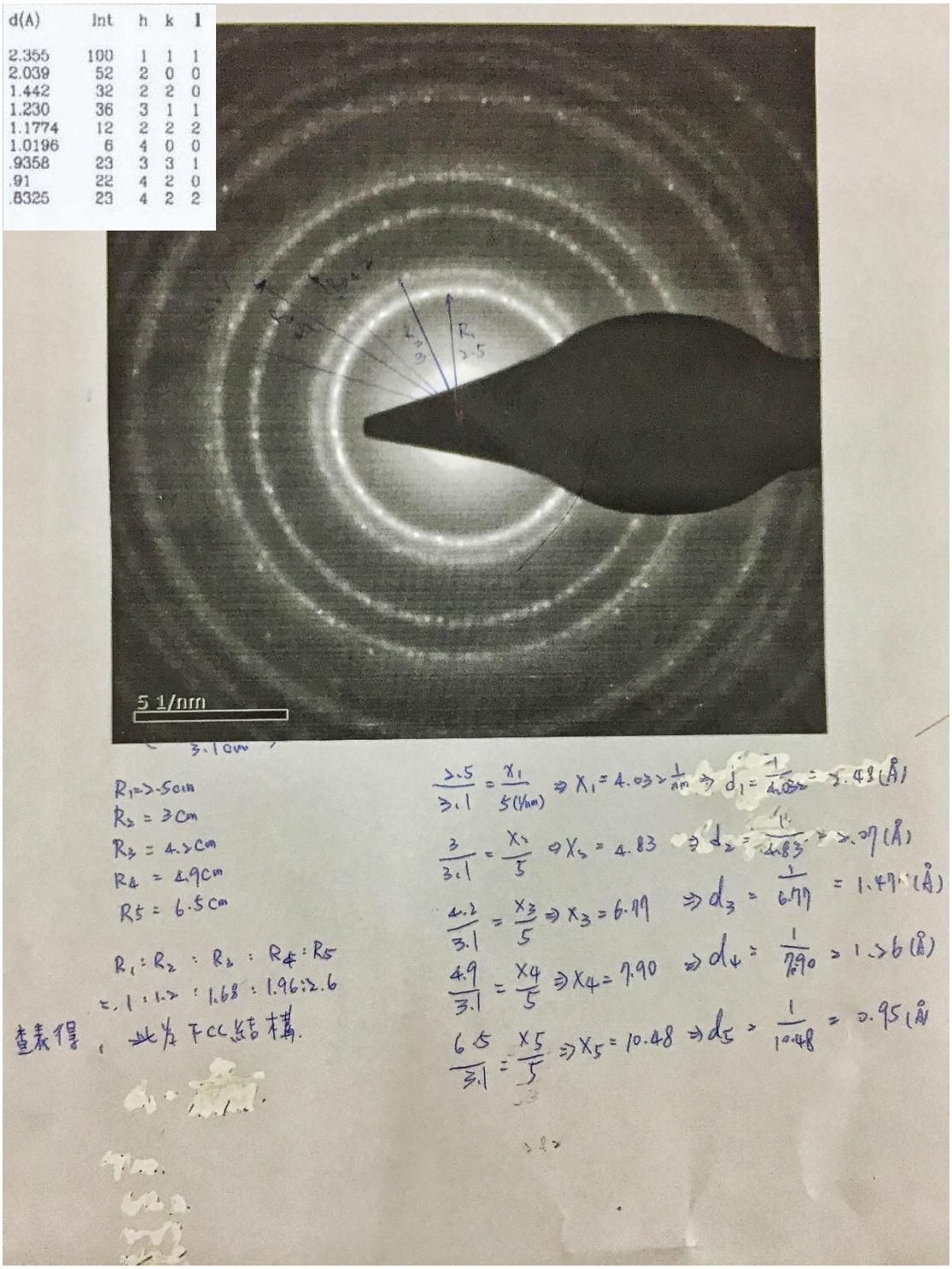
I. Present schematic the basic structures and components of the TEM.



(111)

(200)

(220)

(311)

(331)

2. Compare the image conditions of bright field, contrast mechanism.

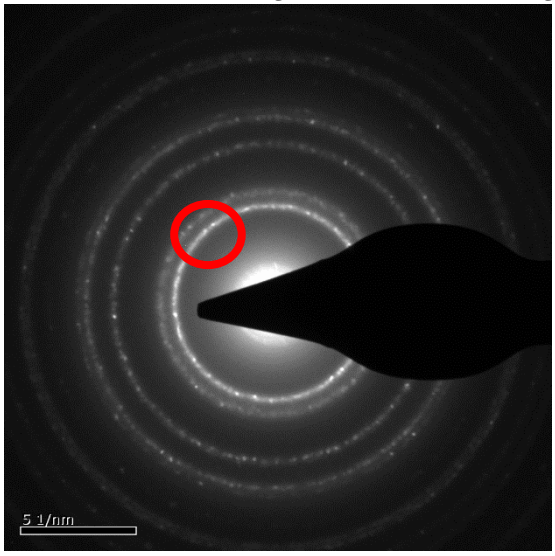
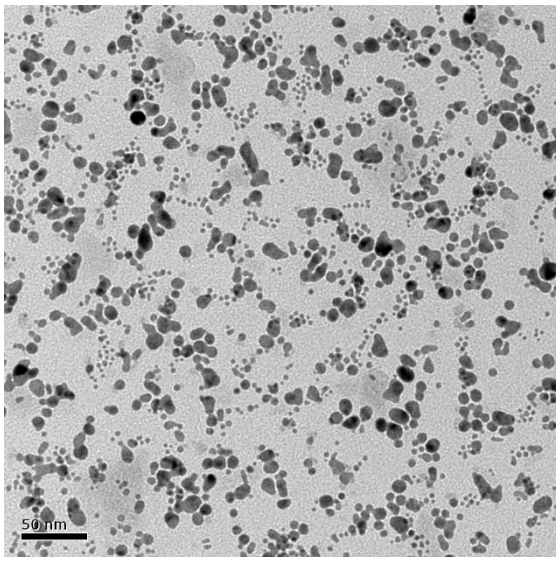


圖 I. Au 之繞射圖。



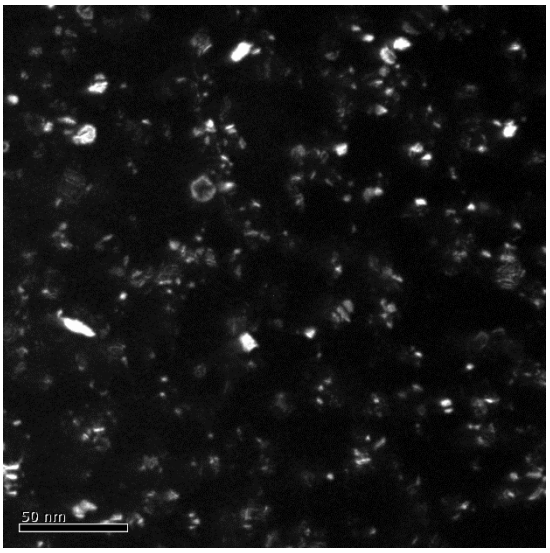
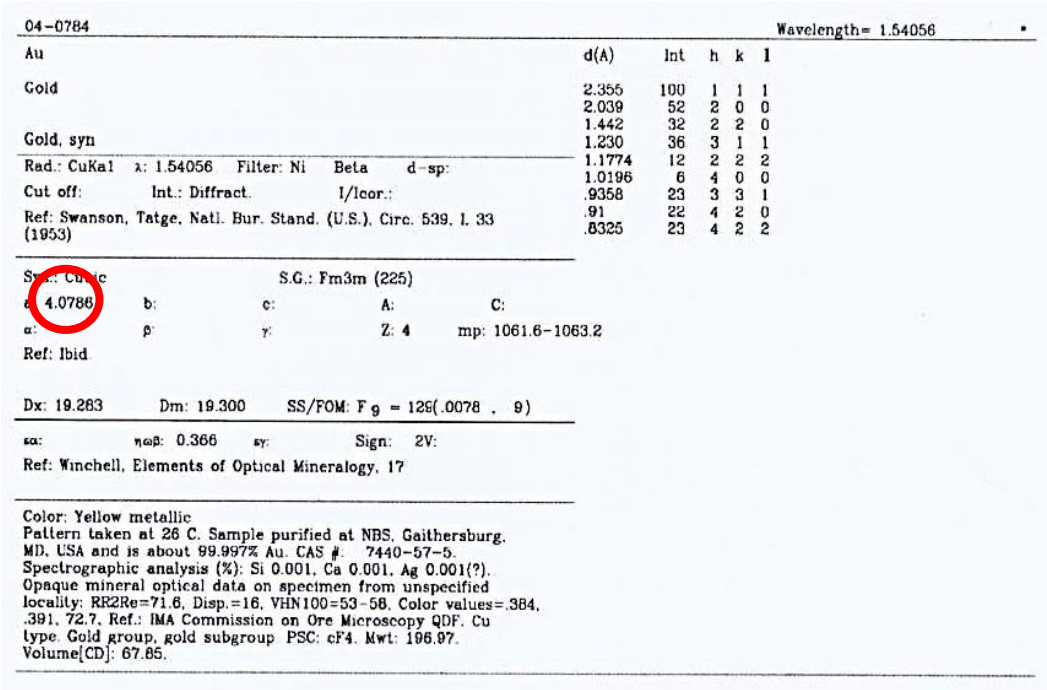


圖 2. 明視野與暗視野圖。

I. 明視野（BF），通常用於一般的觀察，使用物鏡孔徑擋住繞射電子束，只讓直射電子束通過，明視野影像中重元素會呈現黑色，而輕元素會呈現白色。常用於例行觀察，清楚顯示被分析材料或元件的微結構形貌。

2. 暗視野（DF），用於某特定繞射晶面或缺陷觀察，DF 與 BF 差別在於 DF 係使用探針來遮擋直射電子束的通過，只讓繞射電子束通過。除了能顯現晶體缺陷和細微結構的特性之外，也能用於確認特定繞射點對應的相。

3. Measure the d-spacing and lattice constant of Au and compare with the theoretical value in JCPDS file



04-0784 Wavelength= 1.54056

Au

Gold

Gold, syn

Rad.: CuKa1 λ: 1.54056 Filter: Ni Beta d-sp:

Cut off: Int.: Diffract. I/Icor.:

Ref: Swanson, Tatge, Natl. Bur. Stand. (U.S.), Circ. 539, I, 33 (1953)

d(A)	Int	h	k	l
2.355	100	1	1	1
2.039	52	2	0	0
1.442	32	2	2	0
1.230	36	3	1	1
1.1774	12	2	2	2
1.0196	6	4	0	0
.9358	23	3	3	1
.91	22	4	2	0
.8325	23	4	2	2

Sys.: Cubic S.G.: Fm3m (225)

a: 4.0786 b: c: A: C:

α: β: γ: Z: 4 mp: 1061.6-1063.2

Ref: Ibid

Dx: 19.283 Dm: 19.300 SS/FOM: F 9 = 129(.0078 , 9)

εα: ηωβ: 0.366 εγ: Sign: 2V:

Ref: Winchell, Elements of Optical Mineralogy, 17

Color: Yellow metallic
Pattern taken at 26 C. Sample purified at NBS, Gaithersburg, MD, USA and is about 99.997% Au. CAS #. 7440-57-5. Spectrographic analysis (%): Si 0.001, Ca 0.001, Ag 0.001(?). Opaque mineral optical data on specimen from unspecified locality: RR2Re=71.6, Disp.=16, VHN100=53-58, Color values=.384, .391, 72.7, Ref.: IMA Commission on Ore Microscopy QDF. Cu type. Gold group, gold subgroup PSC: cF4. Mwt: 196.97. Volume[CD]: 67.85.

$$d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

由題 1.得知 d_1 為 2.48(Å)

此為 FCC 結構，$d_{I(hkl)}$ =(111)

$$2.48\text{Å} = \frac{a}{\sqrt{1^2 + 1^2 + 1^2}}$$

a =4.295(Å)

4. 與理論值相比較

與理論值 4.0786(Å)相比之下，實際所得之值為 4.295(Å)，推測銅網上的試件有雜質混入。