Crystal Truncation Rods: Ancient and Modern

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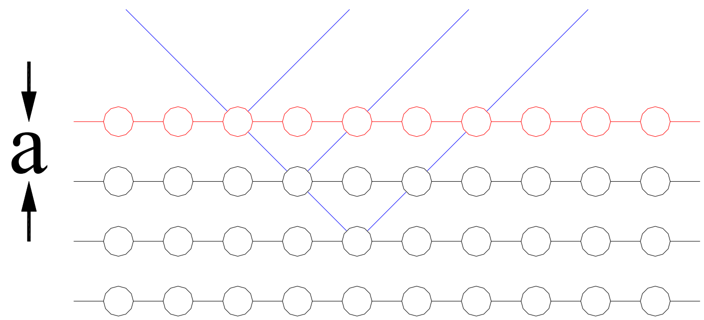
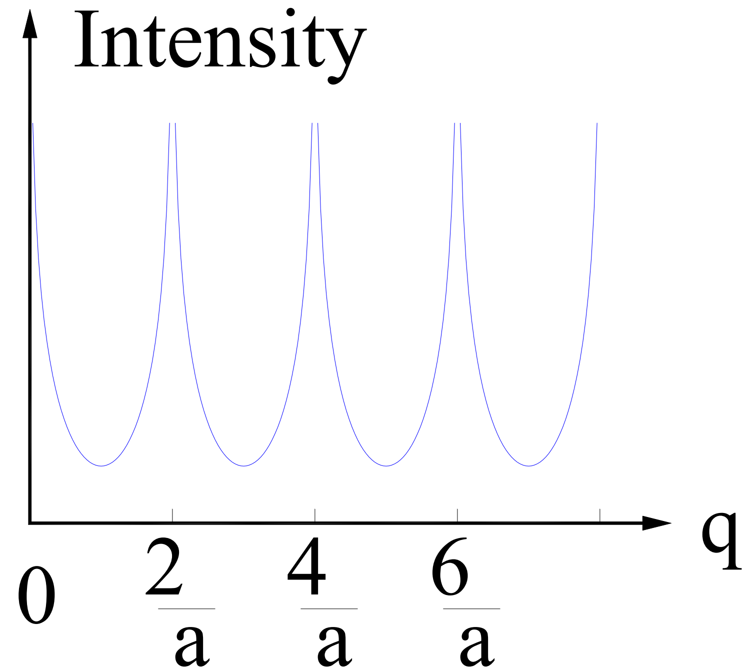
Origin of Truncation Rods



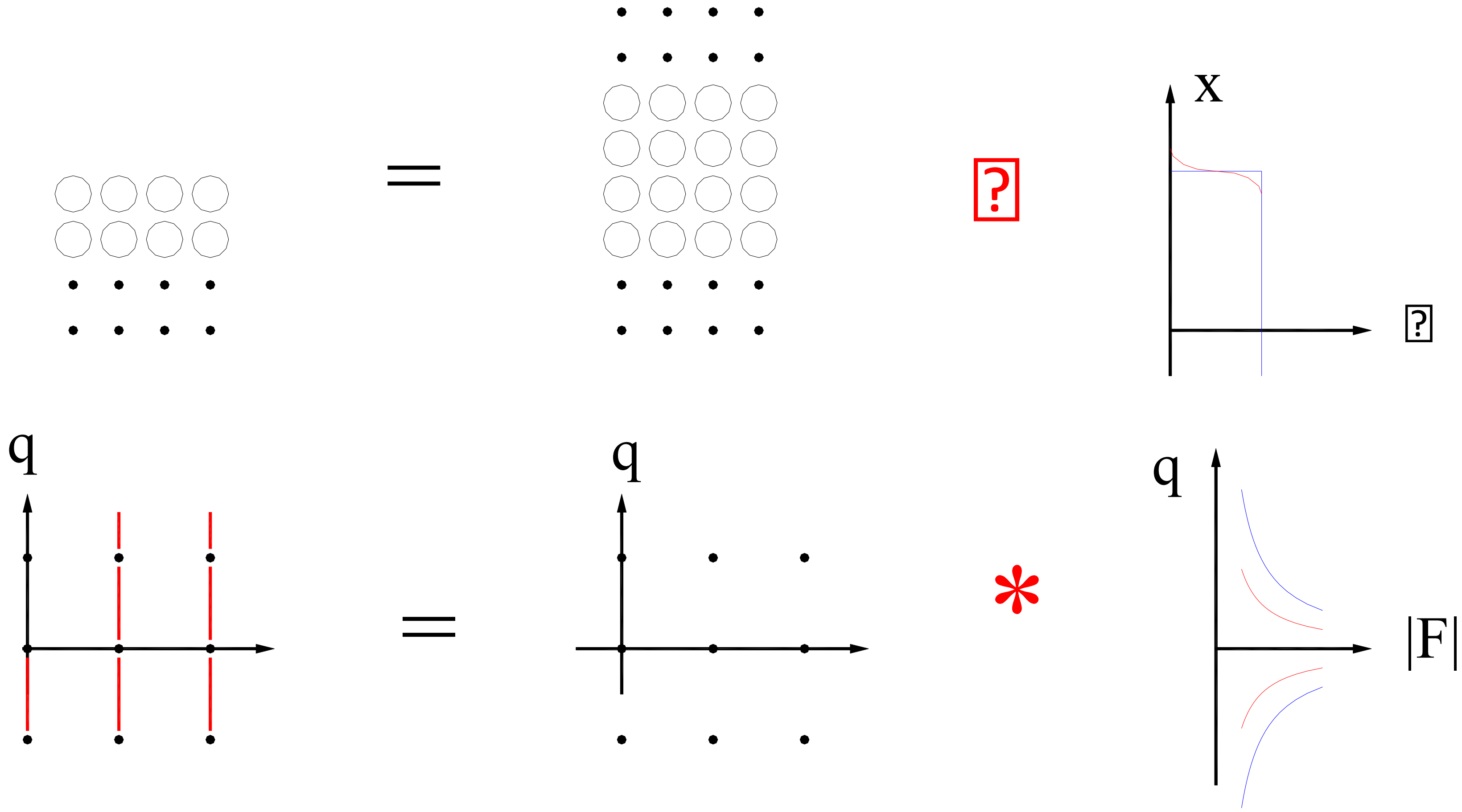
$$F_{CTR} = \sum_{n=0}^{\infty} A_n$$

$$= \sum_{n=0}^{\infty} f_L \; e^{inqa}$$

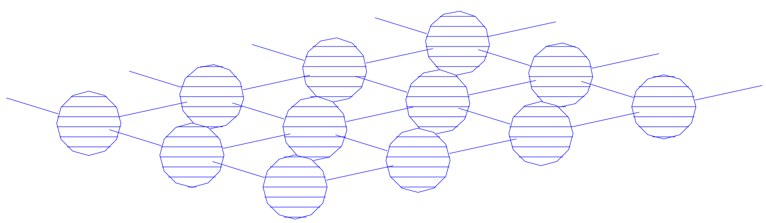
$$= \frac{f_L}{1 - e^{iqa}}$$



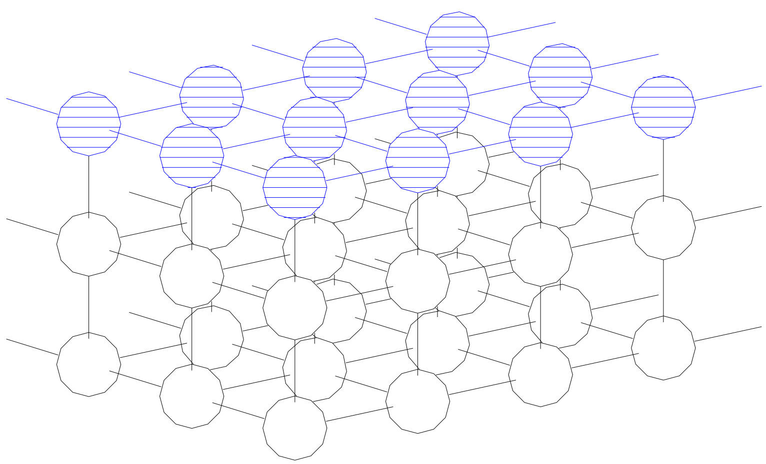
CTR as Convolution



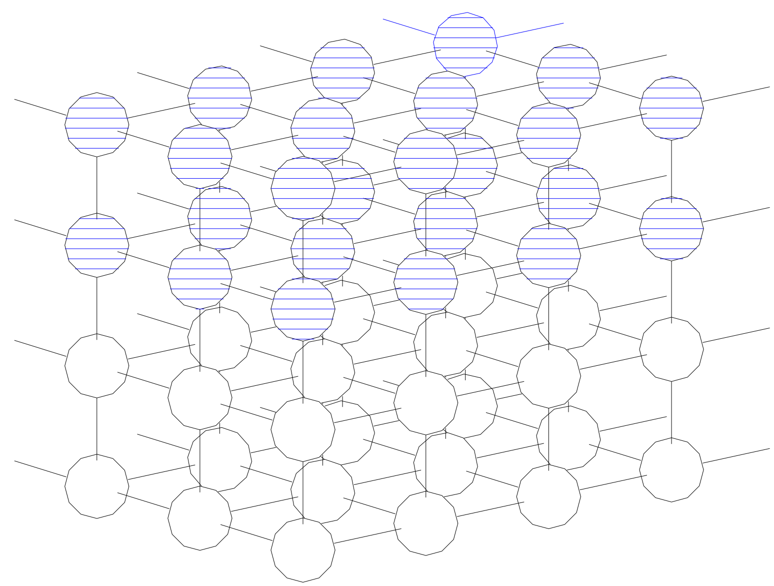
Surfaces and Interfaces



Isolated monolayer



Surface of Crystal



Crystal-Crystal Interface

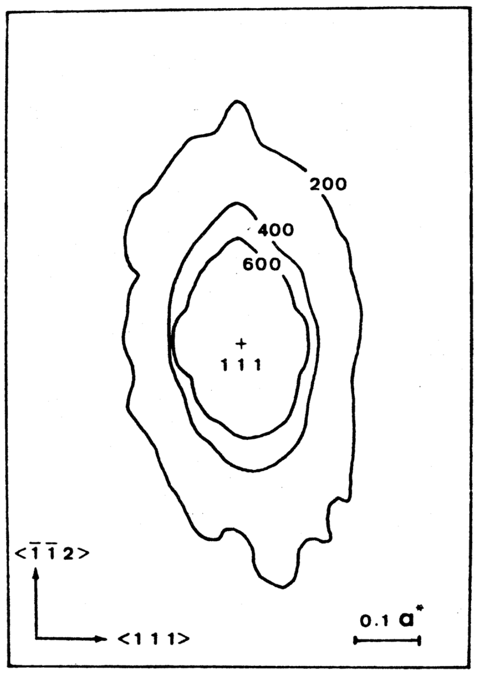
CTR has 2D and 3D Features

Title:
C:\ikr\Pub\Pub1\RPP\RPP4C.DWG
Creator:
PSCRIPT.DRV Version 4.0
Preview:
This EPS picture was not saved
with a preview included in it.
Comment:
This EPS picture will print to a
PostScript printer, but not to
other types of printers.

CTRs of Ga(010) Surface

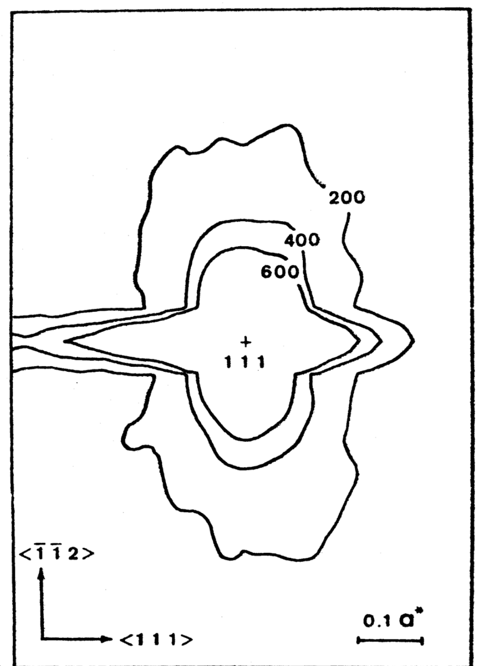
Title:
Graphics produced by WAVE
Creator:
WAVE Version 4.20 (AIX ibmr2)
Preview:
This EPS picture was not saved
with a preview included in it.
Comment:
This EPS picture will print to a
PostScript printer, but not to
other types of printers.

Diffuse Scattering from Si Wafer



(c)

Unpolished wafer



(d)

40 microns removed

N. Kashiwagara, J. Harada and M. Ogino, J. Appl. Phys 54 2706 (1983)

Diffraction as a Surface Integral

Die äußere Form der Kristalle in ihrem Einfluß auf die Interferenzerscheinungen an Raumgittern

Von M. v. Laue

Annalen der Physik [5] 26 55 (1936)

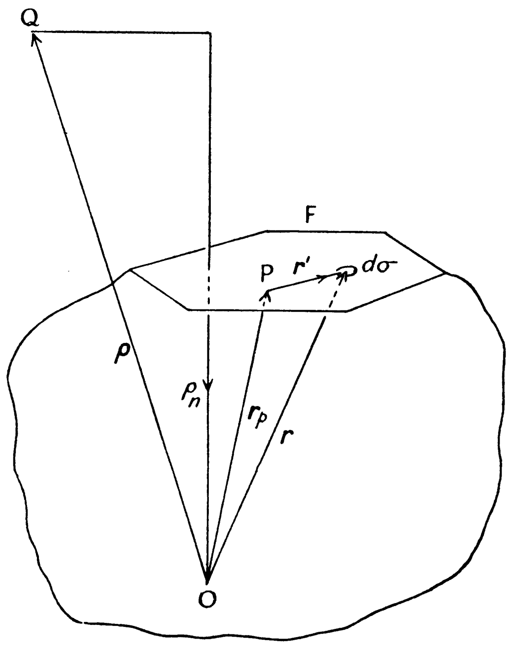
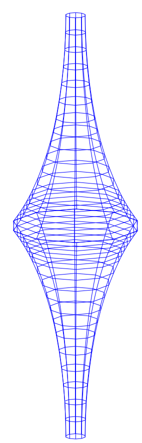


FIG. 200



“Stacheln”

The Warren Lineshape

PHYSICAL REVIEW

A Journal of Experimental and Theoretical Physics Established by E. L. Nichols in 1893

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X-Ray Diffraction in Random Layer Lattices

B. E. WARREN

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(Received March 7, 1941)

Random layer lattice structures are considered which consist of layers arranged parallel and equidistant, but random in translation parallel to the layer, and rotation about the normal. We call a and b the axes in the layer, and c the axis normal to the layer. In this notation there will be crystalline reflections of type $(00l)$, two-dimensional lattice reflections of type (hk), and no general reflections (hkl). Equations are developed for the intensity distribution in a two-dimensional powder reflection, and for the integrated intensity. Equations are also de-developed for the particle size in terms of the peak breadth, and for the displacement of the peak. The powder pattern of a heat treated carbon black is presented as an illustration of two-dimensional lattice reflections.

Powders of 2D Crystallites

Carbon black

B. E. Warren, Phys. Rev. 59 693 (1941)

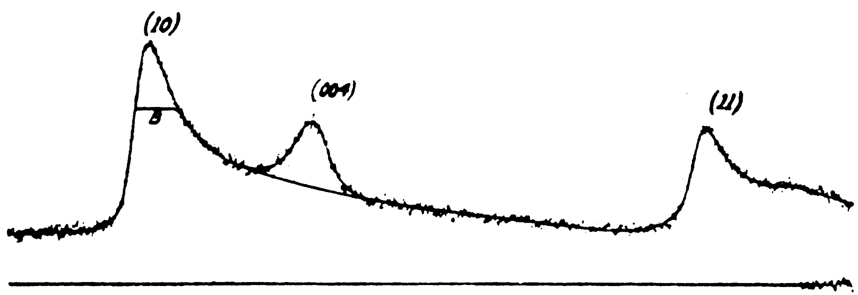
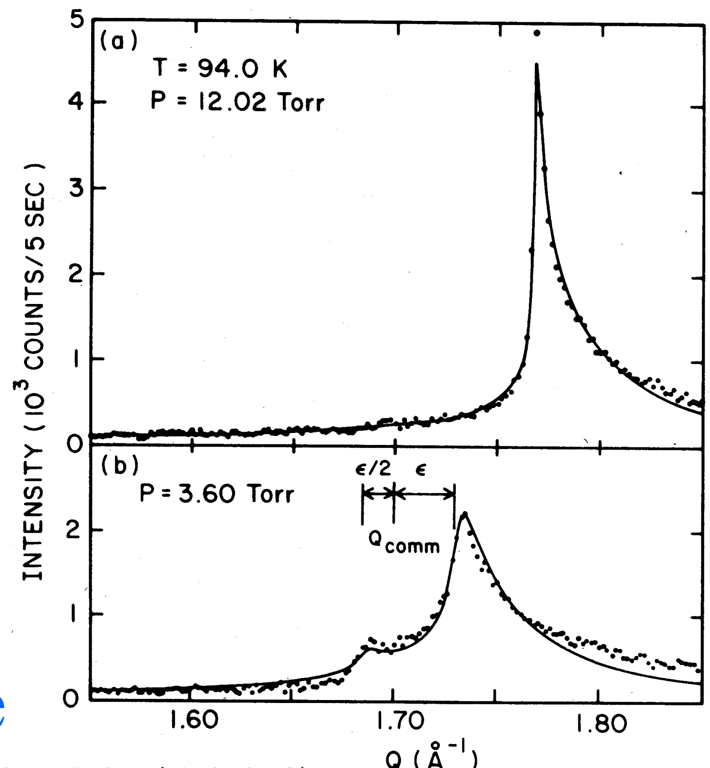


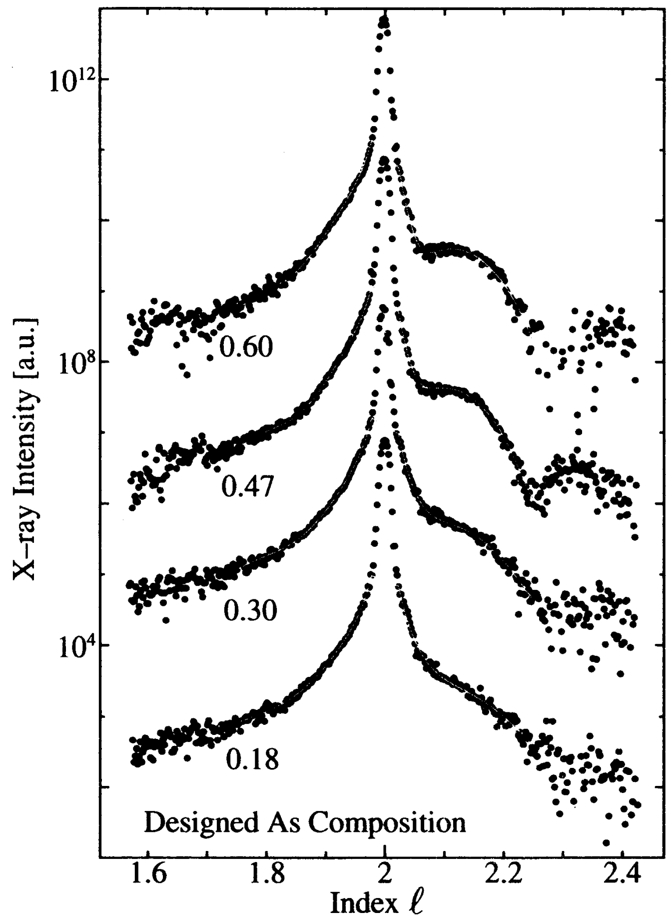
FIG. 4. Microphotometer record of the diffracti pattern of a heat treated carbon black, showing tw dimensional lattice reflections. Radiation Cu $K\alpha = 1.539$ monochromated by reflection from rocksalt.

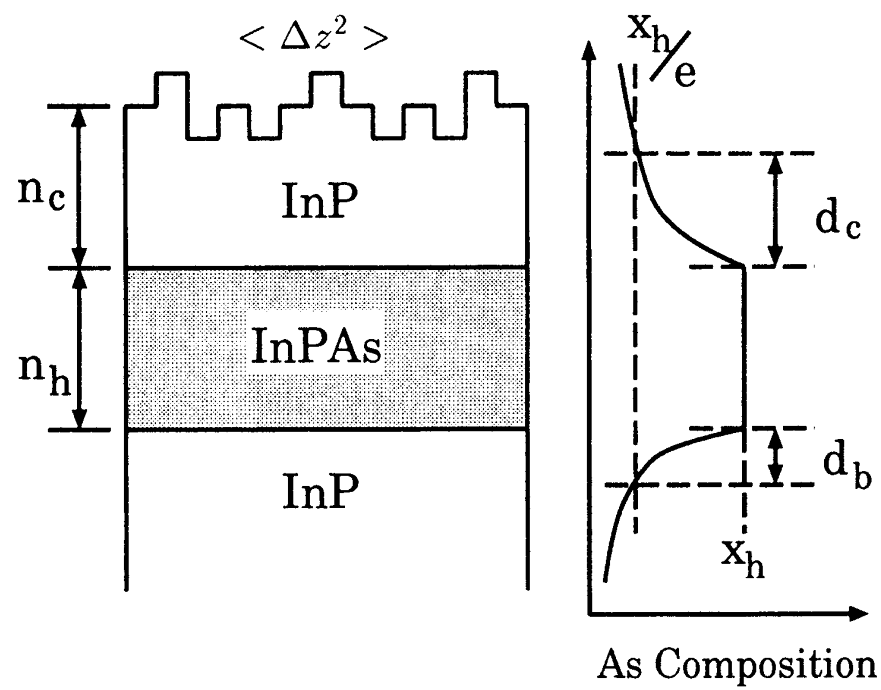


Kr on graphite

P. W. Stephens *et al*, Phys. Rev. B 29 3512 (1984)

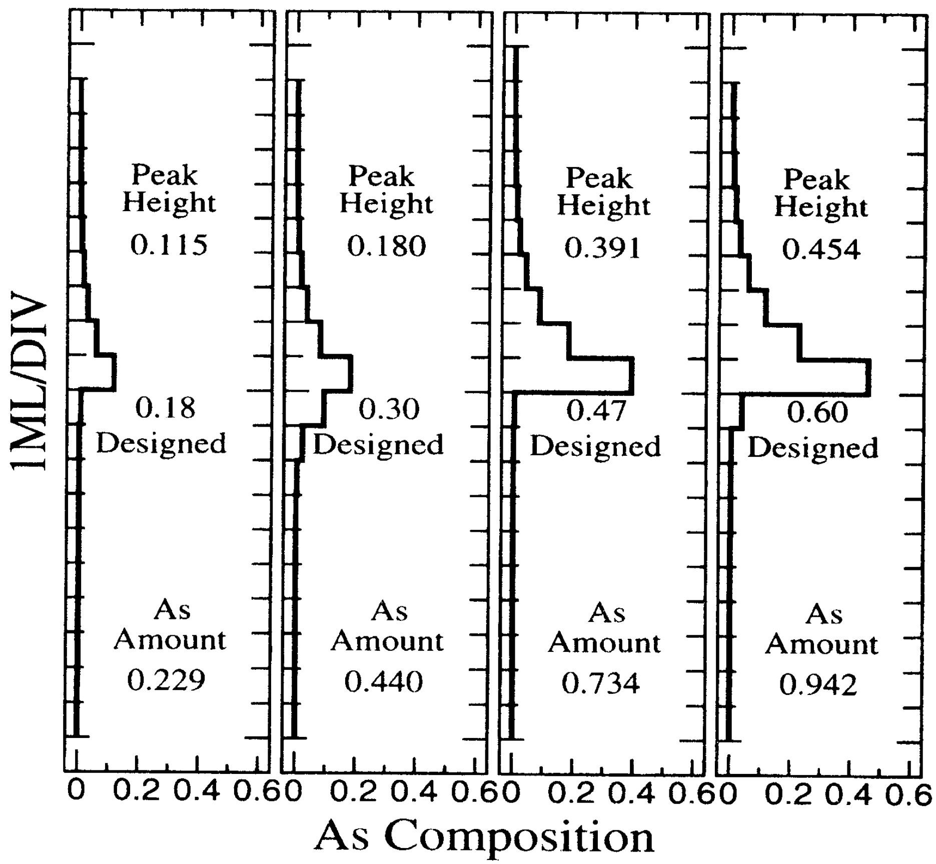
As in InP/InPAs heterostructure

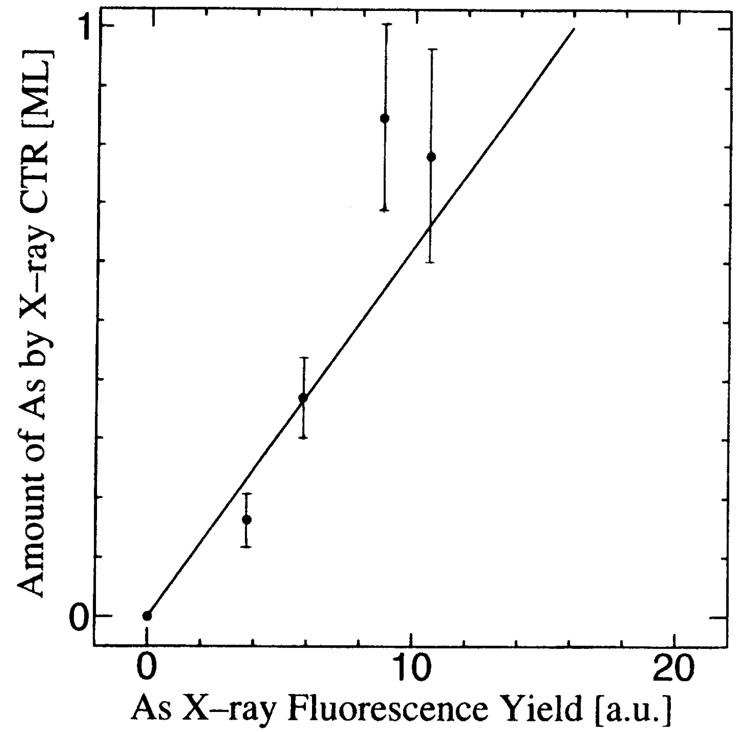




M. Tabuchi *et al* J. Appl. Phys <u>81</u> 112 (1997)

CTR agrees with Fluorescence





M. Tabuchi *et al* J. Appl. Phys 81 112 (1997)