

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



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(PhD)



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AFM SEM XRD

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واژه های کلیدی: لایه های نازک نانومجسمه سازی شده : لایه نشانی خراشی

(Sculptured Thin Films STF)

-

(Sculptured Nematic Thin Films SNTF) ()

Thin Film Helicoidal TFHBM)

SNTF. (Bianisotropic Medium

() V

TFHBM . C S

STF

STF

Si

STF

STF

(Glancing Angle Deposition-GLAD)

Glad

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فصل اول

لایه های نازک نانومجسمه سازی شده

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های نازک از

، (PVD) .[]

، .[] ،

(TEM) .[]

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TEM

(SEM)

¹) Physical vapor deposition
²) Transmission electron microscope
³) Scanning electron microscope

.[] (STF)
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 STF
 [] STF
 .
 .
 STF
 (LC)
 .
 STF LC STF
 LC STF
 () STF
 STF
 LC
 LC
 STF
 .[] LC STF

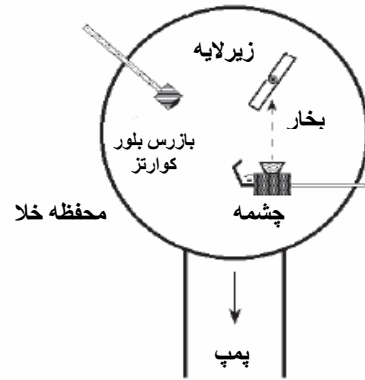
¹) Sculptured thin films
²) Self-assembling
³) Liquid crystals
⁴) Nematic
⁵) Chiral

STF LC STF

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STF

T_m

T_m

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(SZM)

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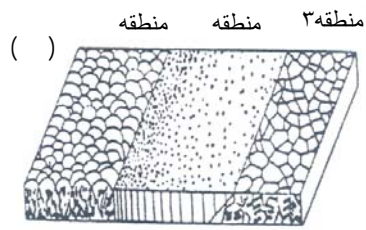
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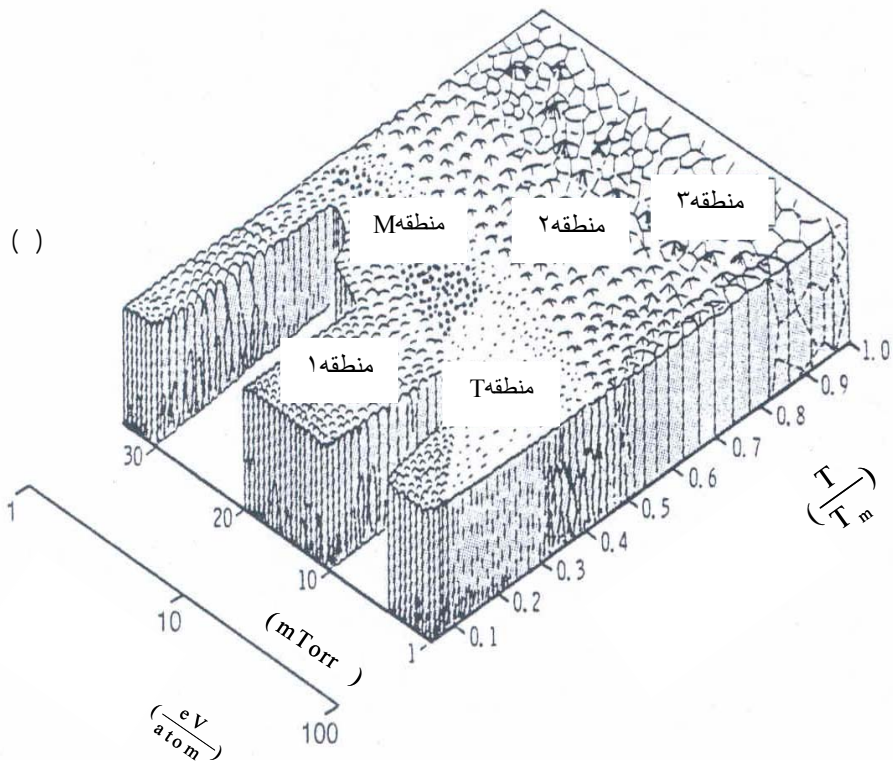
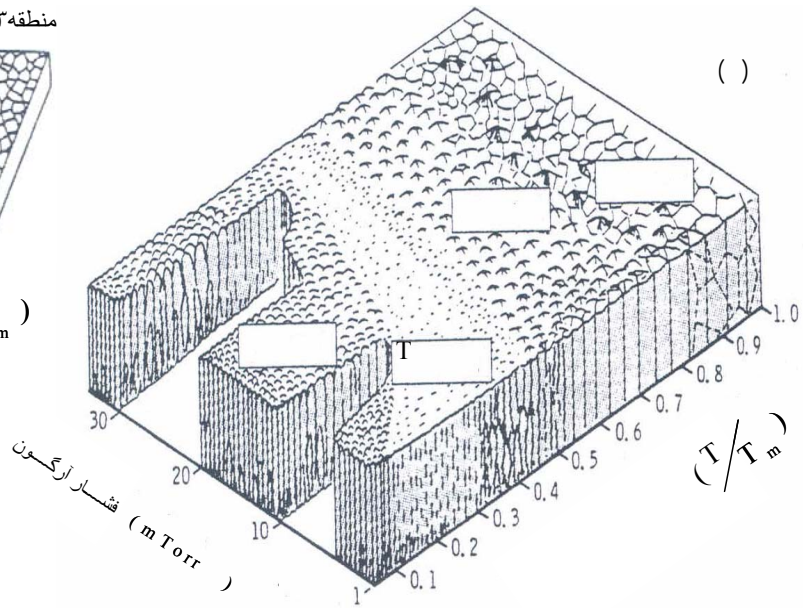
(M)

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¹) Match stick morphology
²) Structural zone model

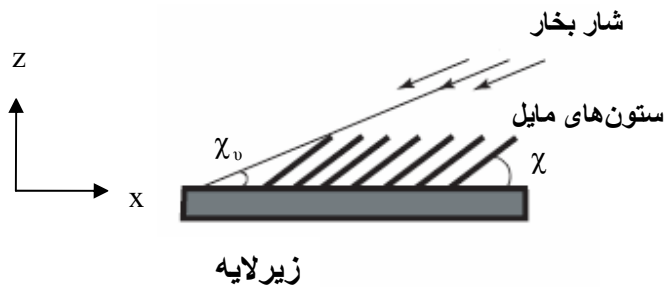


$$\left(\frac{T}{T_m}\right)$$



(CTF)

()



(χ_v)

(χ)

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$$\tan \chi = m \tan \chi_v$$

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$m =$

$\chi_v \quad \chi$

$m \geq 1$

m . []

. [,]

¹) Self-shadowing
²) Columnar thin film

() []

20° χ 0° χ_v

[] $\chi - \chi_v$

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$$\chi = \chi_v + \text{Arc sin}\left[\frac{1 - \sin \chi_v}{2}\right]$$

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()

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χ

STF

(SNTF)

[] (TFHBM)

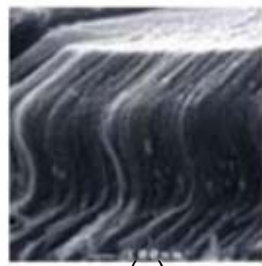
SNTF

TFHBM

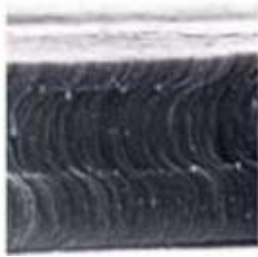
SNTF

¹)Sculptured nematic thin film
²)Thin film helicoidal bianisotropic medium

() . S C :



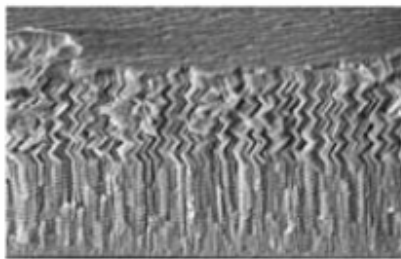
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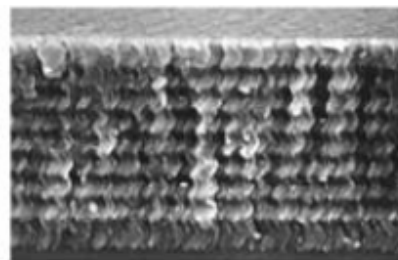
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$\mu m / min$

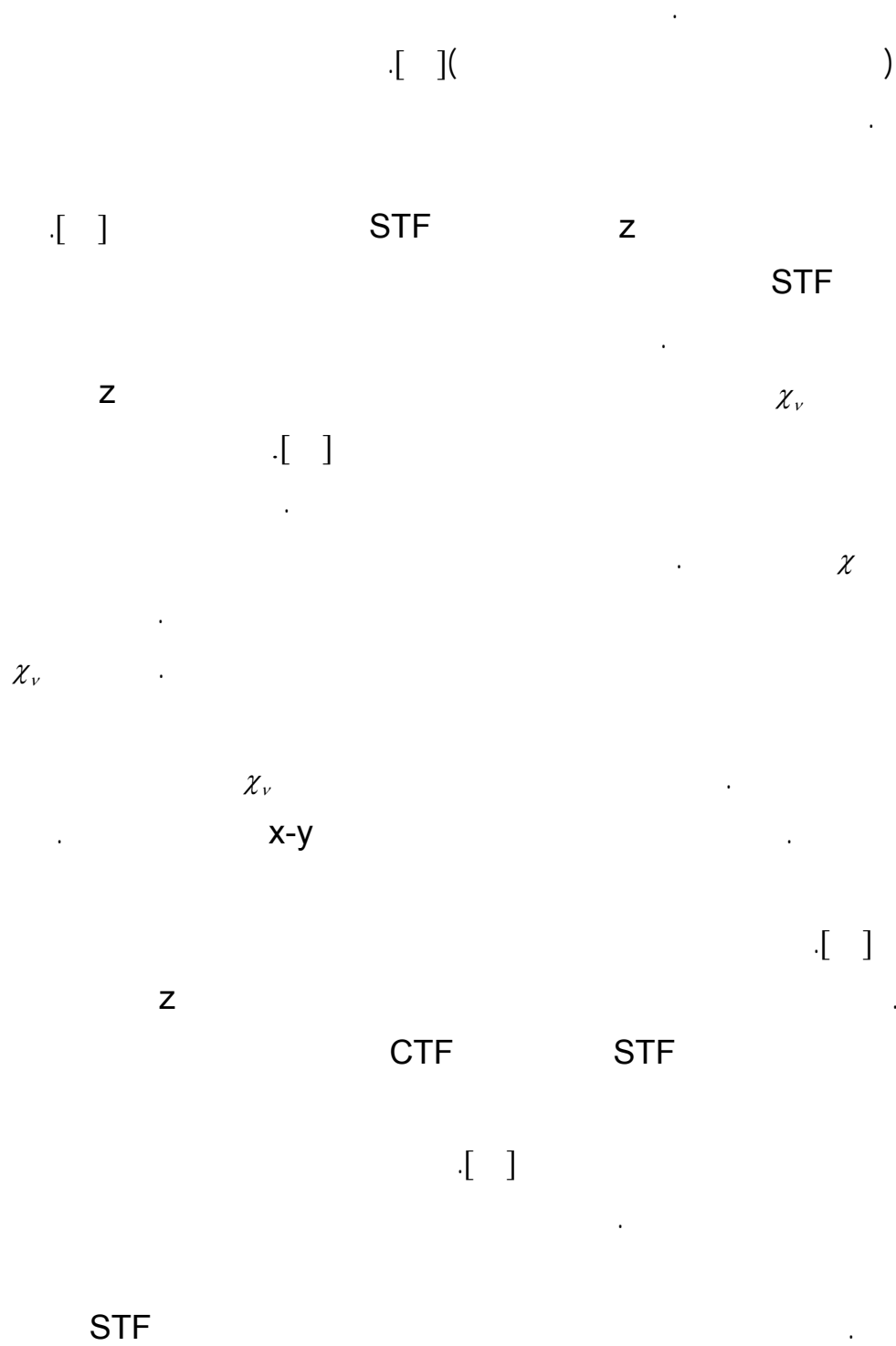
STF

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STF

STF

¹) Rastered electron beam evaporation technique



)Serial bideposition
)Simultaneous bideposition