



انجمن مهندسين متالورژي ايران
انجمن علمي ريخته گري ايران
دانشگاه آزاد اسلامي واحد كرج

همایش ملی مهندسی مواد، متالورژی و ریخته‌گری ایران

MSR

Ni-Al₂O₃

Ni-Al₂O₃

NiO Ni, Al

MSR

Al NiO

Al NiO

(XRD)

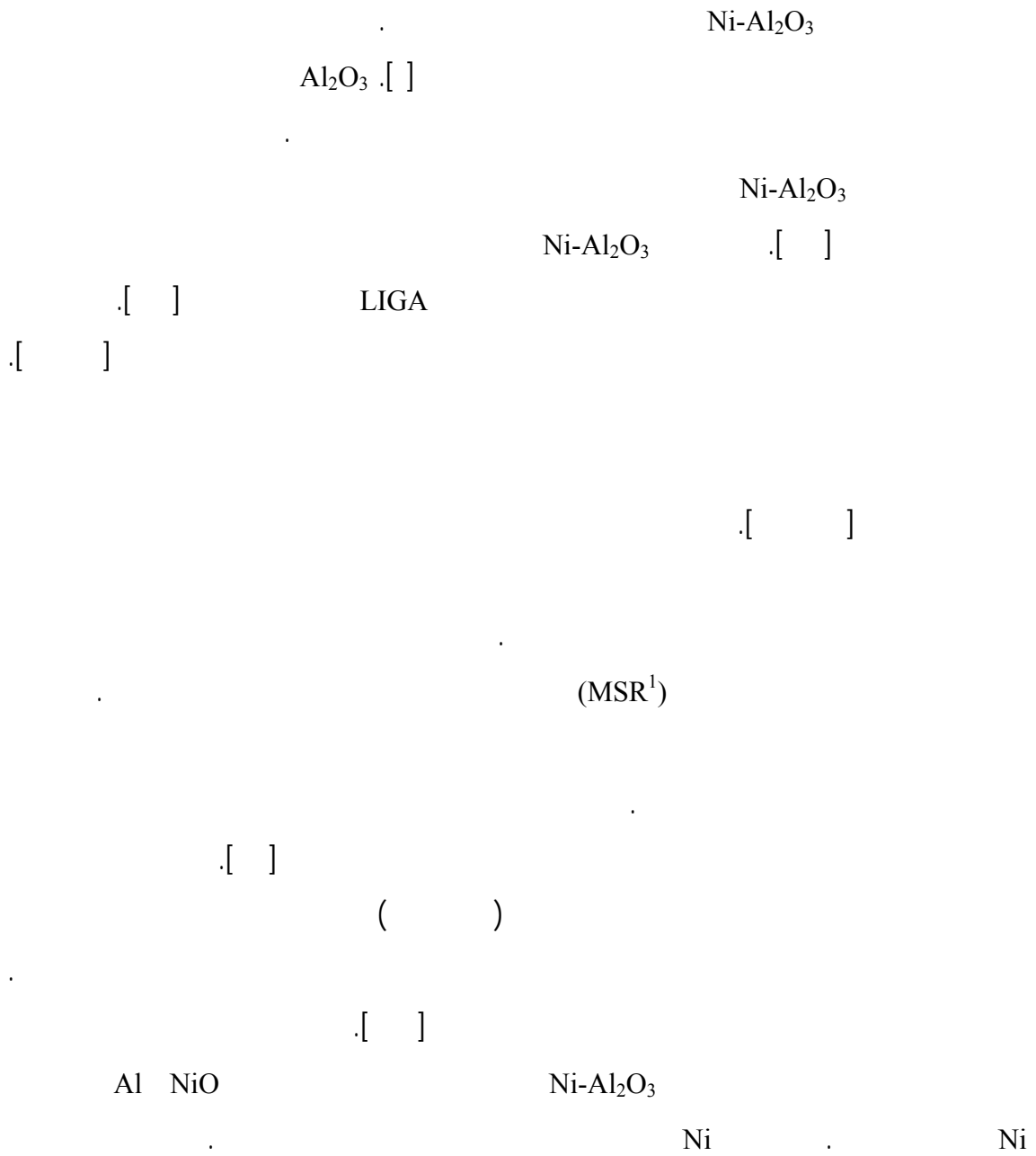
(MSR)

Al NiO

Ni-Al₂O₃

MSR Ni-Al₂O₃

Ni-Al₂O₃
NiO Ni, Al
MSR Al NiO
(XRD)
(MSR) Al NiO
Ni-Al₂O₃



1- mechanically induced self-propagating reaction

:

	(μm)		
Merck		% ,	
Merck		%	
Merck	,	%	

Ni NiO Al

:

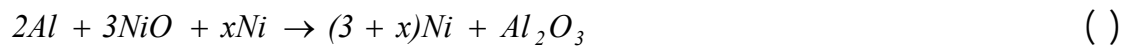
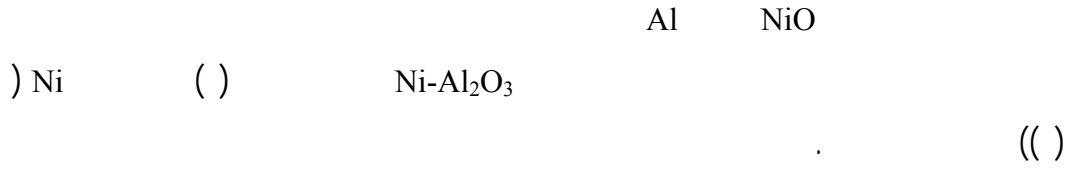
(%wt)		(%wt)			
Al ₂ O ₃	Ni	Al	NiO	Ni	
,	,	,	,	,	A
,	,	,	,	,	B
,	,	,	,	,	C

:

mm rpm
nm Cu K α (XRD)

K

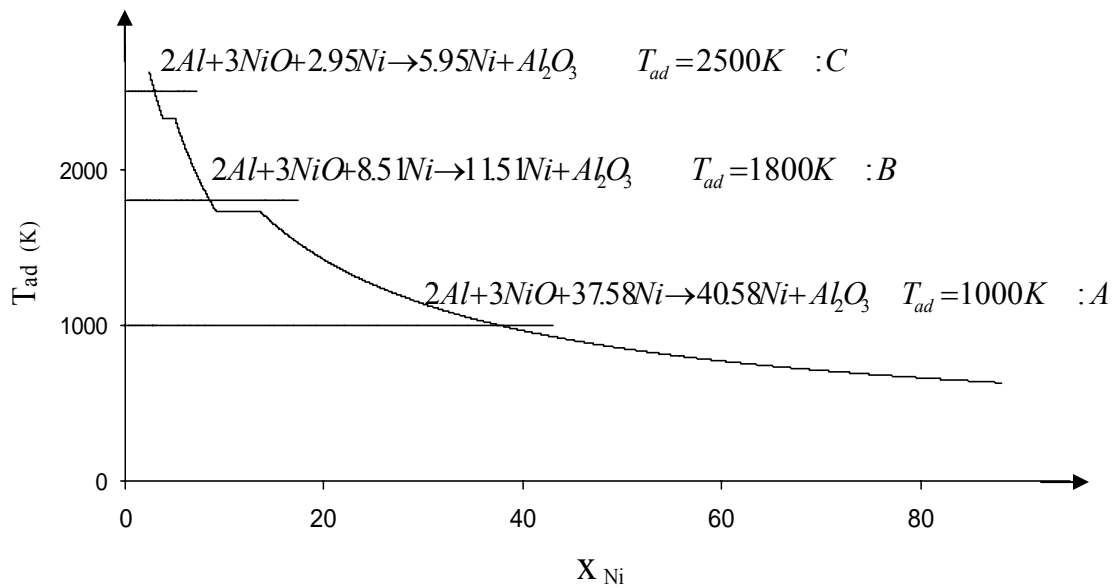
[] K ()

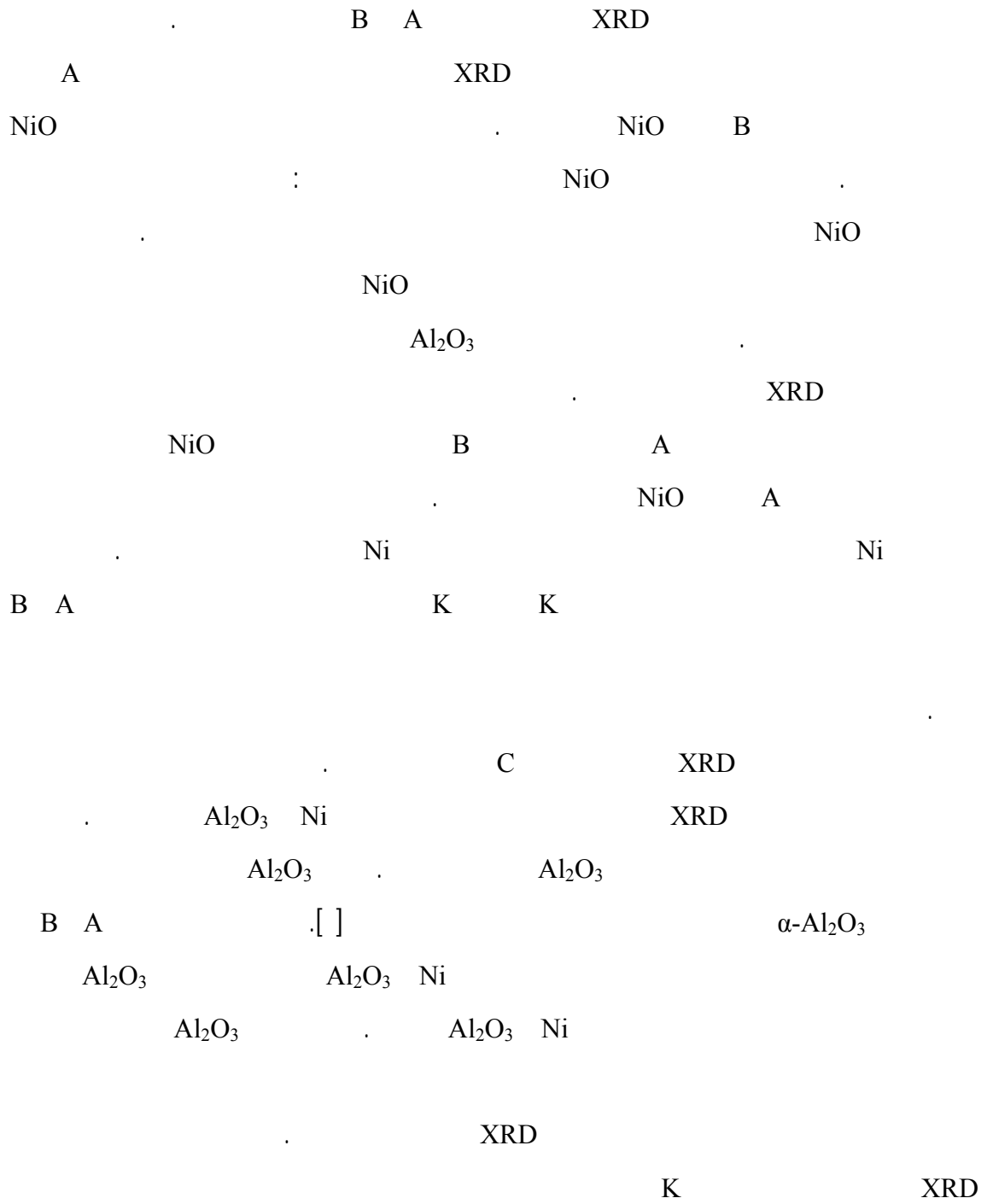


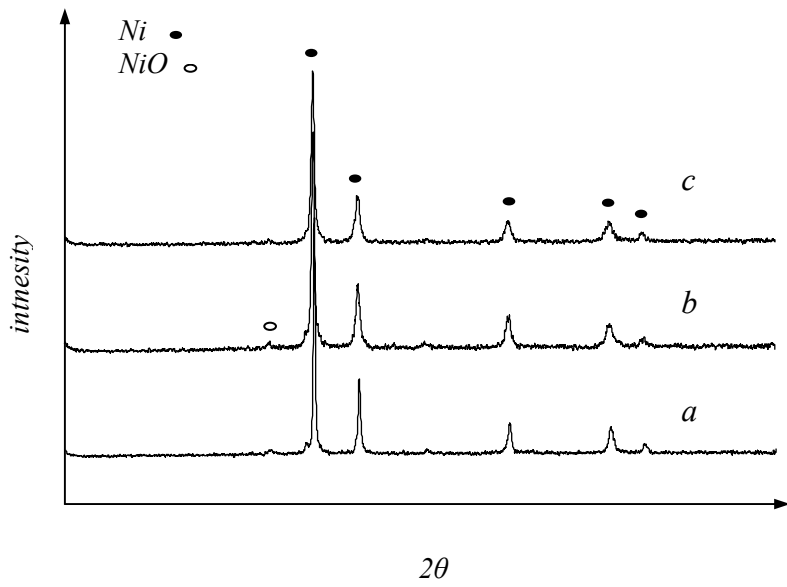
()

() []

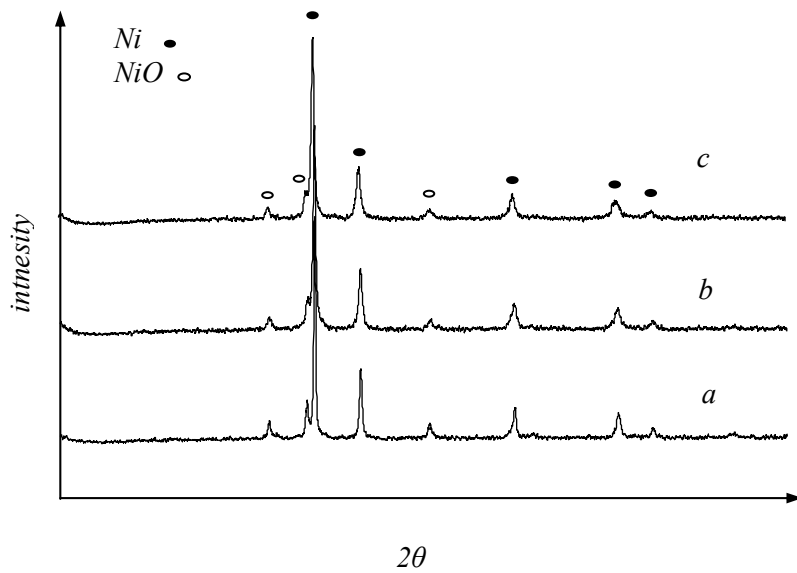
()



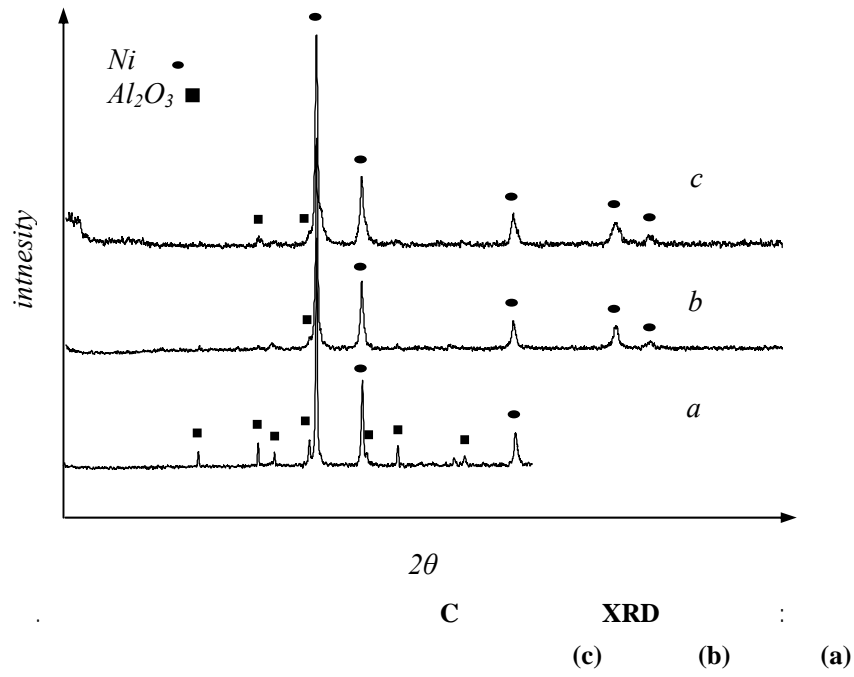




A XRD :
(c) (b) (a)



B XRD :
(c) (b) (a)



Ni

[]

$$\beta \cos \theta = \frac{0.91\lambda}{d} + \eta \sin \theta \quad (1)$$

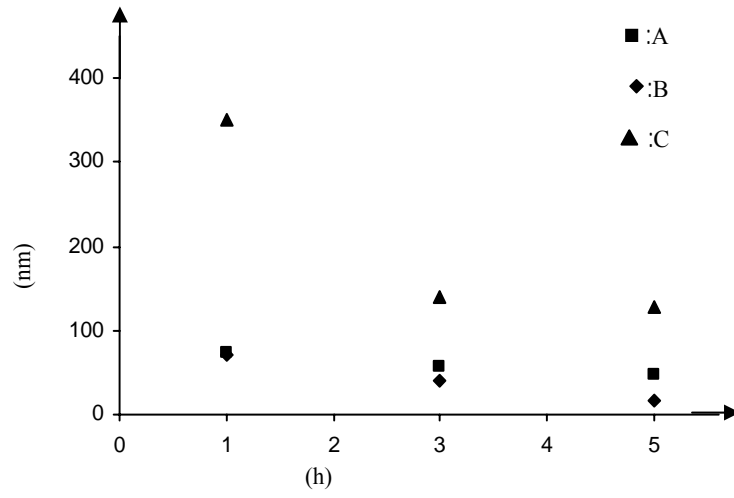
η θ β d X λ

()

B A

C

[]



Al, Ni

Ni-Al₂O₃

NiO

K

A

K

B

K

C

α C

Al₂O₃

B A

C

B A

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Fabrication of Ni-Al₂O₃ nanostructure composite via MSR

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This study investigated the fabrication of Ni-Al₂O₃ nanostructure composite by mechanical alloying of Al, NiO and Ni powder mixtures with various composition of Ni_x(Al₂O₃)_{100-x}. Also the effect of adiabatic temperature reduction reaction of NiO by Al was studied on mechanically induced self-propagating reactions (MSR). The as-milled powder was examined by X-ray diffraction. Composite powder (Ni-Al₂O₃) were prepared successfully for Ni_x(Al₂O₃)_{100-x} (x=77.4) specimens and in this specimens MSR took place. But no alumina was detected for Ni_x(Al₂O₃)_{100-x} (x=95.89) and (x=86.89). In this specimens because of low adiabatic temperature reaction remained gradual. It is also observed higher adiabatic temperature resulted in larger grain size. With increasing milling time, grain size decreased.

Keywords: Ni-Al₂O₃ Nanostructure composite, Mechanical alloying, MSR

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