[illegible]

[illegible] TiO_2/UV

[illegible]

naserise@tums.ac.ir [illegible]

[illegible]

[illegible] (Ag-TiO_2) [illegible] mg/L [illegible] pH [illegible] g/L [illegible] Ag-TiO_2 [illegible] Ag-TiO_2 [illegible] mg/L [illegible] pH [illegible] g/L ،Ag-TiO_2 [illegible] g/L [illegible] g/L [illegible] Ag-TiO_2 [illegible]

[illegible]

[illegible]

Ćǫỿ Æ̃ǫ̃

ɛɬ ÆŨź ΘɬƐ[]ΘΠ Ćʌ ÆłnΘǫ̃ɛƐźɛ p ÆΤăs ǻĸǵķd ÆūɣŃ̈d ĆǪƵƩ ɛɬ p ƵĸhΣ ÃĂĸnǫ̃ ɛɬ ǻƵĸΘʂʌ ƵY ÆăΘΤǫ̃ Oʂźɛ ΘÊŨɬǫ̃ ΘĸΠΘgƐơ ƵŃΘʂɬyΘʂgɬ ĆǪfƐǫ̃ ǰźƐΘ̈d ƵɬŃnŨ̃ ĆʌΘɬƐ[]ΘΠ. Oʂɬ ƵɬƐźɬ ƵY ĸΘƵ̈ƵΘΠŃǪūŃ̈ƵĥǪǫ̃ ǻƵĸƵΘʌ ĸǪĸŨ̃ Ćg YŃ‖Æǫ̃ ķŃʂΤǫ̃ƵɬY ƵţpƐ[]ΘΠ ǰΘǫ̃ɬƐpƐ[]ΘΠ ǻɬɛƵźĸĂƐʂ ΘĸΠΘgƐơ ĸΘĞɬơ ĸΘʂʃĸǪɬ p ɯYŃʌ ƵɬYɛŃ̈ Æźĸ΄ΘƵ̈‖ ǻĸgDŽʊĸ‖ ɛɬ ÆĞź ƵɬŃnŨ̃ Ćʌ Ćg yğYÆǫ̃ ‖ źɬƐźɬ ɬƵ ĆΣŃơ YƵŃǫ̃ yǫ̃ĸΣ ǻĸgyʃĸƵʂŝ p ĸgķÊljĸə Ćʌ ķd ÆūɣŃ̈d ğÊ[]ʊɬ ΡŨĸʌ ΘɬƐ[]ΘΠ ÙĸΘƵ̈ŃnŃ̈ƵūŃ̈ƵĥǪǫ̃ ǻƵĸƵΘʌ. (ĥpĤ) Oʂɬ ǰźɬ p ɯYǁ ƵɬYɬƐŃ̈ ƵŃʊ ƵŤΘʂgɬ ‖ gĸg p ÆʂÃ̈ơ Q̃[]ʂΘʂ ƵY ǻèĸʌ OʊǫŨ ǰΘɯšQ̃g. YYƐūÆǫ̃ ĸΘΠd Ƶyǁ YŃ̈‖g ΡŨ̃ĸʌ ÆźĸʂƵĸΠ ɯYɬY ƵĸɬΘĸ‖ƵɬźūΣ.YŃ‖ ƵĸΠɛ ƵY ǰΘΠΣ njÆʂ ΡŨ̃ĸʌ yɬŃnơÆǫ̃ ƵđΡŨ̃ĸʌ Θyǫ̃ ÆŁèŃĂ ƵY ΘɬƐ[]ΘΠ ÎĤĬ -ĥĬ mg/L ǰΘʌ OʊǫŨ Ćg yŁɬ (Ħ) Oʂɬ ɯYǁ yŁǵ ƵY Ƶɛ Oɬǵ ƵY ǰΘΠΣ njÆʂ.

ɛƵʂɬ ÛƵŃź ğYĸŁơ Ķǫĸǁ ķd ɛɬ ΘɬƐ[]ΘΠ Ùzƒ ğpɬyǫ̃ǫ̃ ǻĸg p pƵ ğYĸŁơ.Oʂɬ ÆźĸÓƵÓǁ ‖ gĸt p Æ[]ʂźɛ ƵŃ̈ʂĸŨ̈ΘÃźƐ[]ΘΠY Û 2 ŃŨ̈ūǫ̃ ÛyŁŃ‖Æǫ̃ ɯYĸÃ̈[]ʂɬ ɛΘΠ ɯY Ɛ[]ʂū ƵŃĂ Ćʌ Ćt 2 ŃŨ̈ūǫ̃ ɛƵʂɬ p ƵŃźĆźŃ̈ĸĶ} ƵŃ‖ ǻĸgķĸʂŝ ĆΘÃdžơ p Ɛ[]ʂʌ LjźŃ̈ũơ Kź ĸΘ fɬ yŁǫ̃ɛĸΘΠ ĸŁĸŨ̃ OŁ̈ɬƐǫ̃ yŁǫ̃ɛĸΘΠ ɛΘΠ Æ[]ʂźɛ ƵŃ̈ʂĸŨ̈ΘÃźƐ[]ΘΠY p pƵ .yΘĸ̈ʂsğ ǻyΘĸ̈Ńơ ǻĸgyŁźƐə ǰźɬ Ɛʌ ɯpÊŨ̃ ÛOʂɬ ÆĸƋ ǻɬƐ[]ʂʌŃʂ jΘǫ̃ĸơ p YKźɛ ÆźĸÓƵÓǁ ‖ gĸt ĸʌ ĆʂźĸÆǫ̃ ƵY ĸNJüʌ p Ć[]ʂğƋ ĸǫŃƵŨ̃ Æʌpɛ̃Ğǫ̃ǫ̃ yŁźƐə Ɍź YƵŃǫ̃ ƵY ĀΘÃ̈Tơ p ĆūʂŃơ ǰźɬƐʌKΘʌ.(ħ) yŁ[]ʂğ DŽãĸΠ ǻĸgpƵ ɛɬ ƐσǻYĸdžΠǻɬ Ćt YŃ‖ Æǫ̃ ÆłnΘΘ ‖ Θr Ćt Æ[]ʂΘĸĸơĸt Ûyǁʌĸ ÆŨźţŃ̈ĺŃ̈ɬ ǻĸgźɬƐǫ̃ ǻɬƵɬY p ÆźĸÓƵÓǁ ŃŨźɛΘə p ÆŨźţŃ̈ĺŃ̈Θʌ .(Ĭ)Oʂɬ ǻƵpƐlj

ǰźɬ ƵɬƐ‖Σ ǻɬƐʌ ÆĦΣŃơ ĶʌĸǎǻĸgĞĸΘʂ‖ĸŨ̃ ǻɬƵɬY ŃŁĸ ǻƵpĸŁə ĆDžƐŨ̃ YƵɬp ǪΘÆ[]ʂǫ̃ ƵŃĂ Ćʌ Kź ǻƵpĸŁə ǰźɬ ÛOʂĸgÆ[]ʂĸg ĞΘΠ̃ǻ Æǫ̃ ĸΘΠd ǻƐΘūɯɛɬyΘɬ p ÆźĸʂĸΘ‖ Ćʌ GƵg p ÛĸgźɯYŁźèd Ùzƒ yŁźɬƐə ƵY Ɛΰʂǫ̃ ƐΘΘŭơ Gź YĸŁźɬ ĸΘ Ǫ̃Æ[]ʂǫ̃ ƐΘΘŨ ƵŃĂ Ćʌ Kź p YŃ‖ Kź Ùzƒ ŭĂ̈ Ćʌ ɬƵ njźɬƐ‖ ƵđOΘgĸǫ̃ ƐΘΘŭơ Kź p ɯYŁźèd Ùzƒ Ƶĸǫ̃ƐĞΘΠ ĆʌɬƵ ǻĸgźɯYŁźèd ‖ gĸg ǻĸg p pƵ ĆźɬƵɬ ǻɬƐʌ ΘĸÆΘÆ̃Tơ ÛĸgyŁźɬƐə ǻèĸʌ ĆŁźƵg p ÆΠèŃĂ ƵɬŃnơÆǫ̃ ĆǪƵƩ ƵđɛɬĆt Oʂɬ ǫĸǁɬ ğĸf ƵY ƵĸΘšQ̃g Ɛơ ɬ sĸΠǫ̃ (Photocatalytic Degradation) ǻƵpƵΘΘĸĸơĸtŃ̈ə ĆźƵʃơ Ćʌ OΤơ ɯYŁɯtɯYŃ̈d YɬŃǫ̃ ÛǻƵpƵ΄ΘΘĸĸơĸtŃ̈ə ĆźƵʃơ ƵY .YŃƵ̈ ɯƵĸǁɬ

yΘʂɬ ΘɬƵź ƵŃNJf ƵY p (UV) ‖ ĂbɬƐə ŃơƐř ‖ ʌĸơ ƐΘǫĸơ (ZnO) ǻpƵ yΘʂgɬ p (TiO_2) ǫŃΘΠǪǫΘơ yΘʂgɬ ǻY ƐΘΘ̈ ǻƵǫə .(ī) yŁŃ‖Æǫ̃ ĆźƵʃơ

Oʂźɛ njΘΤǫ̃ ǻĸgźyŁźèd ɛɬ ǻƵĸΘʂʌ ǻpƵ ƐʌǫŃΘΠǪǫΘơ yΘʂɬ ǻY ĸʌ ƵĸūƐĸs ΘèŃdžΤǫ̃ ĆʌɬƵ ĸHΠd ÛŨzƒ ƐʌɯpÊŨ̃ p ɯYŃʌ ƐǫŃǫ̃ ɯYƐĸʌ ÛƵɬƵƵɬ ΟƵΘźã ĸʌ ɬ ΘɬƐơ ǰźɬ .yŁɬÆǫ̃ ĶźyŁơ Oʂźɛ njΘΤǫ̃ ǻĸgǻyŁźèd ƵY ÛΟəĸźɛĸʌ ƵĸŨ̃ǫ̃ ĶΘΘ̈ ŁɬƵƵ ĆʌΘɬƐơ ǰźɬ .(Ī) YƵɬY YƐ[]Ƶĸɬ ĸgźyŁźèd Ùzƒ OΠΣ Æ[]ūŁDž yŁźĸǫ̃ ÆźĸgÆ[]ʂĸɬ ɬ ΘɬƐơ ǰźɬ ǻɬƐʌ ɯyǁ ƐgƵ ǻĸźɬƐǫ̃ ƵĸŁg ǻƵźĸÆǫ̃ ƵY ɯyǁ ÆłnŮ ǻĸgĆŁŃ̈ƵʌĸʌĆʂʌźĸÆǫ̃ ƵY ĸgƵŃơNə ɛɬ ƐŁƵɬ ƐǫŃǫ̃ ɯYĶǻ[]ʂɬ ĸgƵƵƐ[]ŨźɬYyǁǫ̃ ɬ ΘɬƐơ OŮƐʂ ǰǫƵ èĸʌ ÛƐŨźY ƐDžĸŁŮ ĸʌ TiO_2 YpyΤǫ̃ ɯźĸʌ ƵY OΘĸĸūə p ÛƵŃŁ ĆǫΘʂP Ćʌ ɯyǁ yΘĸŃơ ΘɬƐǻƒ p ǰźɬƐĸΠd. Oʂɬ ţƐāǫ̃ ƵđYƵŃǫ̃ ƵY (ħǵǵ nmɛɬ Ɛ[]ƵɬƵţ) ƧŃǫ̃ ğŃĂ ŃơƐř ɯźĸʌ p Ɛ[]ʂū p TiO_2 Æ[]ʂΘĸĸơĸtŃ̈ə ÆźɬƵĸţ YŃ‖ŁʌƵŃŏŁǫ̃ Ćʌ ɛɬ ǻƐΘūŃ̈Ωƨ ǰΘɯšQ̃g p Æłn Ɛ[]ŃŁ ĆΘfĸŁ Ćʌ ƵđƐ[]Ńǫ̃ ÆźɬƵĸţ ΘĸΘǫƵƵǻƐΘƒƐDžɬ ÛɯƵĂ̈f ø ƵpƐ[]ŨźɬyΣ ÛyŁźɬƐ[]ΘΠ YɬyΘūơ ĶǫźĸΠ P25 ŮŃ‖ pY Ɛg ɛɬ TiO_2 Ćʌ ɯƐÊ‖ ƵYpƵəɬ .yΤźź ‖ źɬƵəɬ ÛyǫĂΘΠ ĸΠd ƵY ɬƵ Æ[]ʂΘĸĸơĸt ΘĸΘDžŃơdžƵ yŁŃơÆǫ̃ Hombikat ŮŃ‖ p ÛǻƐźĸʂ ÆłnŮ ΡΤʌ ƵY ΘɬƵǫə ŮɬŃ‖ɬ ǰΘʌ ƵY .(Ĭ) yźĸƵ̈ ΟźŃÊơ ğĸÆ[]ɬ p ɯƐÃ̈f ø ƵpƐ[]ŨźɬǻƐʂʂɬyΣ Ćt Oʂɬ ɯyǁ ɯYɬY ƵĸɬΘ‖ ΤźƐΤơ ǻɬƐʌ ɬƵ njźɬƐ‖ p ɯyǁ OźŃÊơ ɯƐÊ‖ ƵŃNJf ƵY ƵĸʌΘΘƵđžƵ ÛǰźɬƐʌ ƵpÊŨ̃ .yŁgÆǫ̃ ƐΘźYĸǫ̃đ ÆłnƐǫ̃ ƵŃ‖ njʂŃơ TiO_2 ɬƵ ɯyǁ ÆłnŮ ǻĸgOʂΘĸĸơĸg ŮŃ‖ ǰźɬ ÛźƐÊ‖ ΘĸΘΘɬtƐơ Æ ɬ t ǻƐ[]ɬĸʌ.(Ĥǵ) Oʂɬ ɯYŃƵ̈ ķɬzΣ ƵĸΘʂʌ ÆźɬYƐyŁūơ ƵY ĸHΠd YƐ[]ƵĸɬΘ ǻɬƐʌ ƵY :yŁəÆǫ̃ ãĸĂ̈ơ ǻɬĆǫƒƐǫ̃ ƵY ‖ ɬɬ Ťź yŁźɬƐə ǰźɬ ğŃĂ ƵY YƐźzɪÆǫ̃ ΘƵŃDž t’ĸΘΠŃǫd Ś śs p OźƐ[]ΘΠ Ćʌ ΘɬƐ[]ΘΠ ĶźyŁơ ɛĸŮd ƵţpƐ[]ΘΠĆʌ t’ĸΘΠŃǫdĶźyŁơ ǻyΰǻ ‖ ɬɬPĸǫɬÛ(DĸΘƒɬĸźź ‖ ǵĸg ‖ ɬɬP) ƵY (‖ ǵĸg) DĸΘƒɬ ‖ ɬɬP .(‖ źĸʂɬ ‖ ɬɬP) Oʂɬ ƵţpƵyΘǵ p

سلامت و محیط دوره پنجم/ شماره سوم/ پاییز ۱۳۹۱
فصلنامه علمی پژوهشی انجمن علمی بهداشت محیط ایران

(HCOOH) (Hole Scavenger) Ag-TiO_2 (Photodeposition)؛ (Sol-gel) (Hydrothermal) Chemical) (Photoreduction) .(Vapor Deposition

Swamiathan DB53 DR23 Tryba

Shirzad Siboni UV/TiO_2 pH pH= min mg/L g/L Ghanbarian UV TiO_2 LAS

Ag-TiO_2 UV

TiO_2 Ag-TiO_2 Degussa ,25

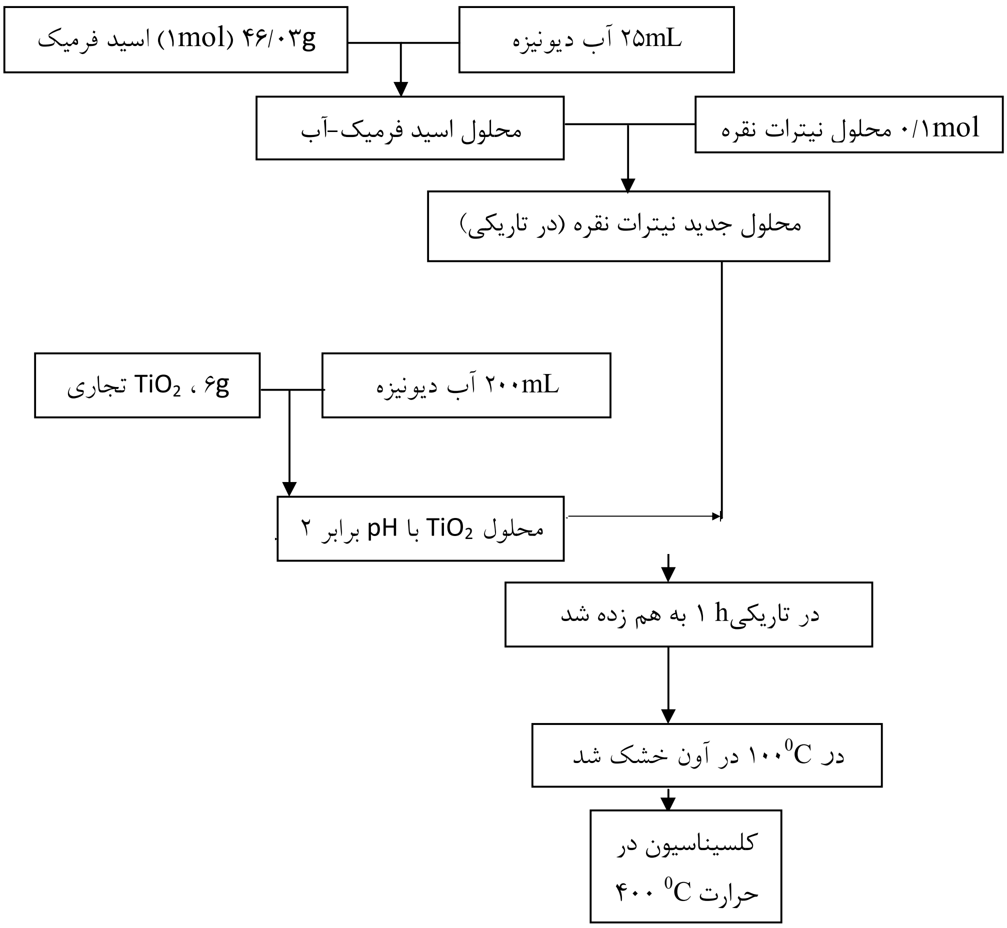
TiO_2- Ag (at%) (Ag/Ti) Scanning Electron Microscope-Energy Dispersive)) Seron Technology AIS-2100 (X Ray (SEM-EDX X' Pert MPD (Transmission ZEISS-EM10C Electron Microscopy (TEM)) KV (Accelerating voltage) Brunauer- Emmett- Ag-TiO_2 Autosorb 1 Quantachrome Teller (BET)

nm

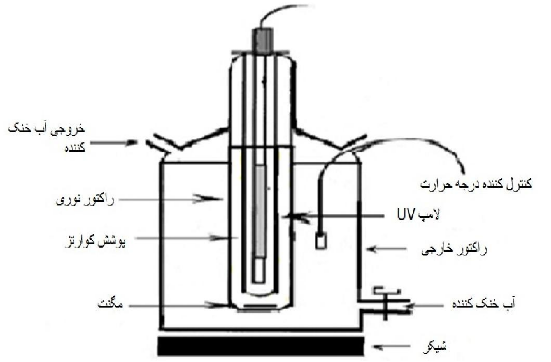
[illegible] L [illegible] L [illegible] W) [illegible] cm [illegible] cm [illegible] cm [illegible] mg/L [illegible] Ag-TiO_2 [illegible] g/L [illegible] pH= [illegible]

[illegible] NaOH [illegible] pH [illegible] N [illegible] HCl [illegible] N [illegible] mg/L [illegible]

[illegible] min [illegible] mL [illegible] rpm [illegible] min [illegible] (Perkin-Elmer Lambda [illegible] (25-UV/Vis Spectrometer [illegible] nm [illegible]



[illegible] Ag-TiO_2



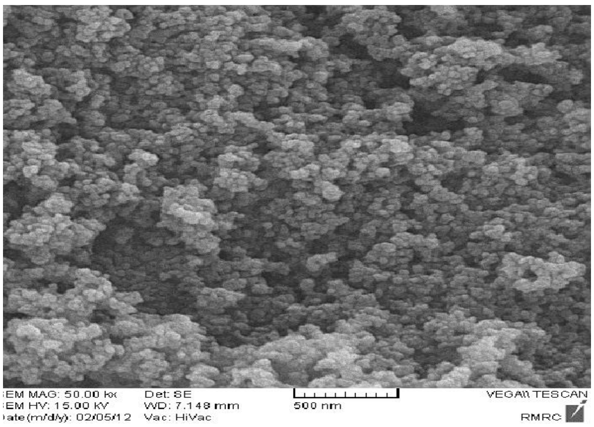
[illegible]

[illegible] Perkin- [illegible] (Lambda 25-UV/Vis Spectrometer Elmer [illegible] nm [illegible] DR5000 [illegible].

[illegible] Ag-TiO$_2$ [illegible] UV [illegible] UV [illegible] pH [illegible] Ag-TiO$_2$/UV [illegible] UV [illegible] SPSS16 [illegible].

[illegible]

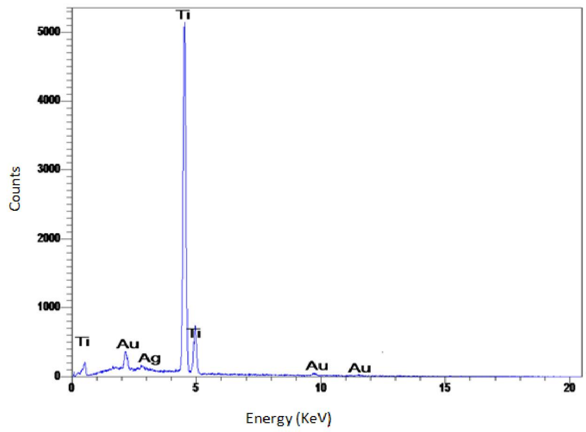
[illegible] SEM-EDX [illegible] Ag- doped TiO$_2$ [illegible]



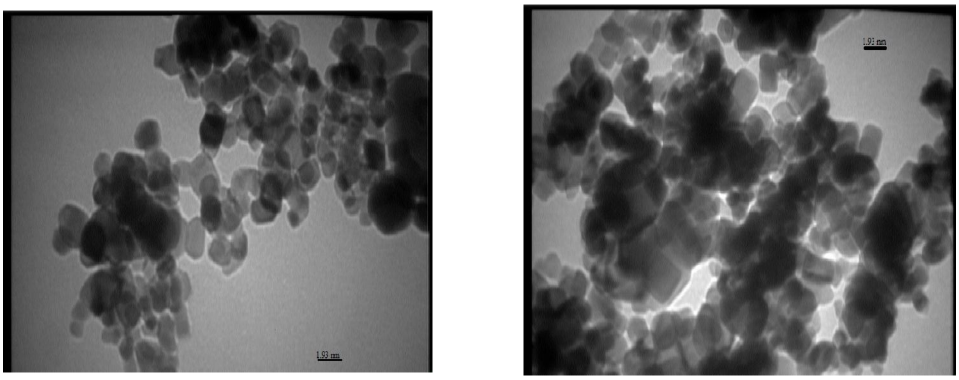
[illegible] SEM

[illegible] SEM-EDX [illegible] (wt%) [illegible] (at%) Ag [illegible] Ti [illegible] (Ag/TiO$_2$) [illegible] Au [illegible] SEM [illegible] TEM [illegible] nm < [illegible] XRD [illegible] Ag-TiO$_2$ [illegible] (R) [illegible] (A) [illegible] P25) [illegible] (TiO$_2$ Degussa [illegible] BET [illegible] TiO$_2$ [illegible] Ag- [illegible] doped TiO$_2$ [illegible] TiO$_2$-P25 [illegible] m^2/g [illegible] Ag-TiO$_2$ [illegible] TiO$_2$- P25 [illegible] m^2/g [illegible].

[illegible] pH [illegible] pH [illegible].



[illegible] SEM-EDX [illegible]



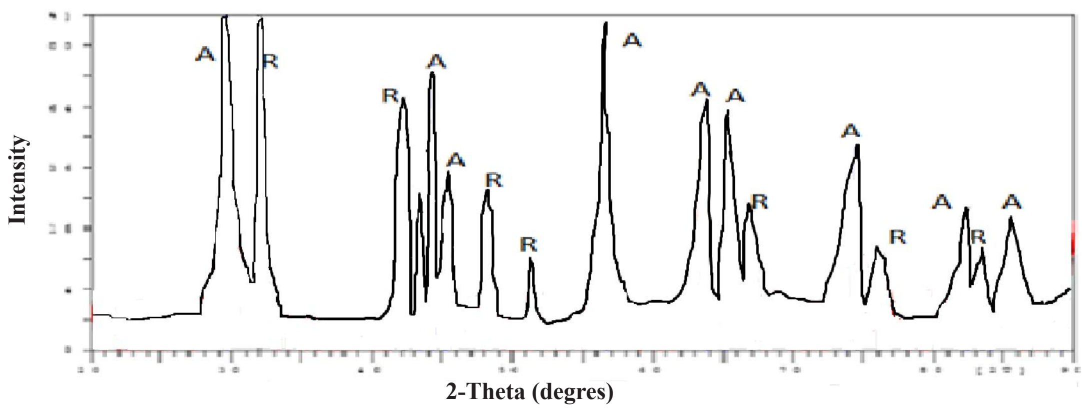
[illegible] TEM

[illegible] mg/L [illegible] pH=[illegible] [illegible] pH=[illegible] [illegible]. [illegible] Ag-TiO$_2$ [illegible] g/L [illegible]. [illegible] Ag- doped TiO$_2$ /UV [illegible] mg/L [illegible] min [illegible] mg/L [illegible].

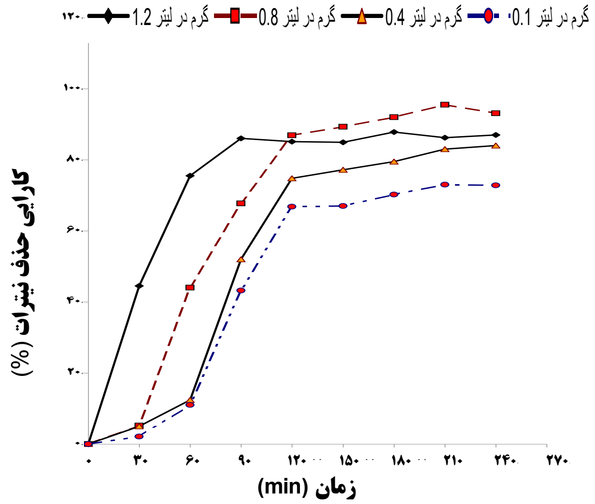
[illegible] pH [illegible] pH=[illegible] [illegible].

Ag-TiO$_2$ ،Ag-TiO$_2$/UV [illegible] UV [illegible] mg/L [illegible] Ag-TiO$_2$/UV [illegible].

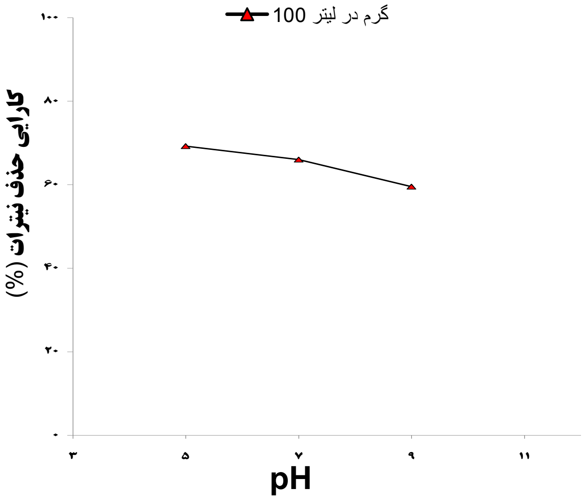
[illegible] mg/L [illegible] mg/L [illegible].



[illegible] (2-Theta-Scale)



[illegible] :Ag-TiO$_2$/UV [illegible]
pH=[illegible] ؛C$_0$= [illegible]mg/L



[illegible] pH [illegible] C$_0$= [illegible]mg/L [illegible]
t=[illegible]min؛Ag-TiO$_2$= [illegible]g/L :Ag-TiO$_2$/UV

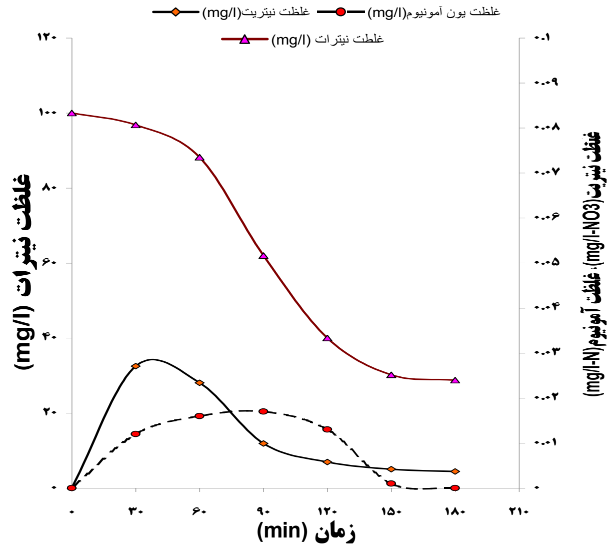
[illegible]

[illegible] SEM-EDX، TEM، XRD و BET [illegible] Ag- doped TiO$_2$ [illegible]

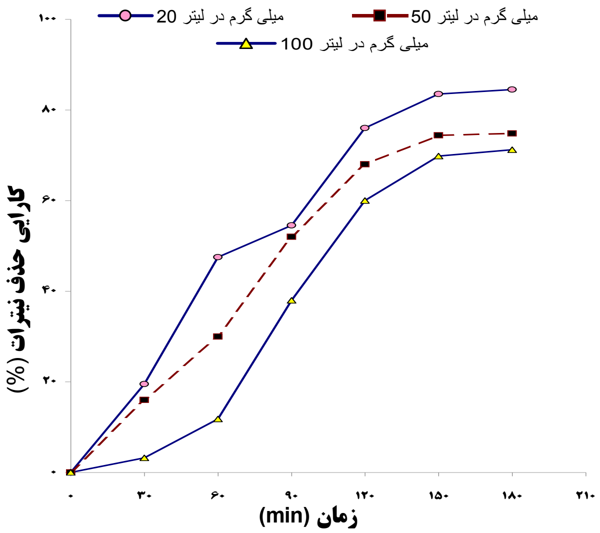
[illegible] TEM [illegible] Ag- doped TiO$_2$ [illegible] nm [illegible] TiO$_2$ [illegible] nm [illegible] SEM-EDX [illegible] (wt%) [illegible] (at%) Ag [illegible] Ti [illegible]

Ag- doped TiO$_2$ [illegible] Ti [illegible] Ag [illegible]

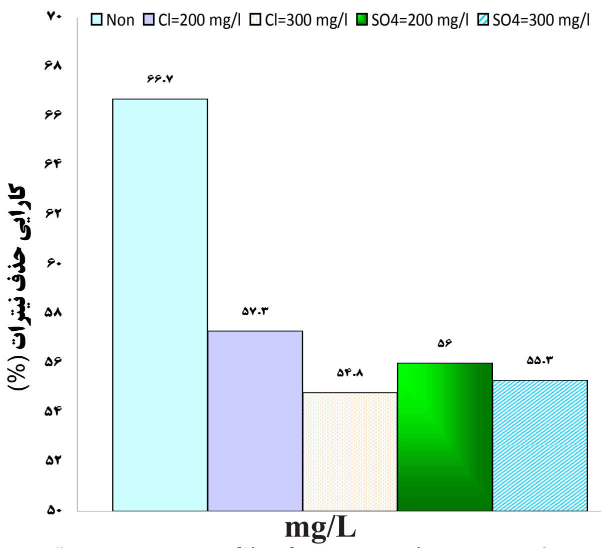
[illegible]



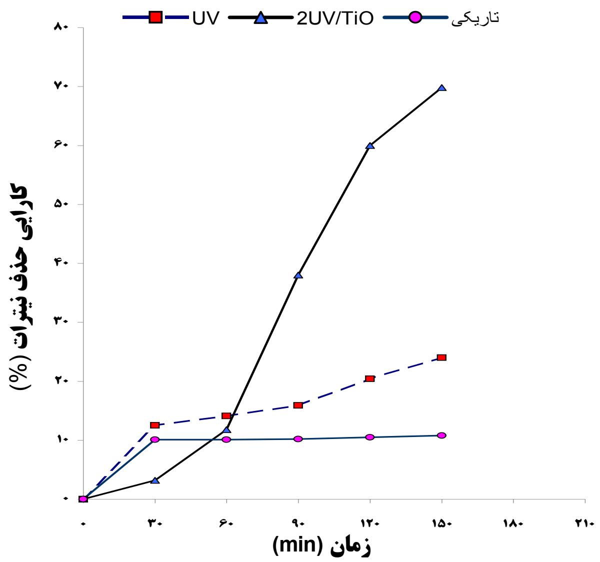
[illegible]
Ag-TiO$_2$= [illegible]g/L ،pH=[illegible] ،C$_0$= [illegible] mg/L : Ag-TiO$_2$/UV



[illegible]
Ag-TiO$_2$= [illegible]g/L ؛pH=[illegible]: Ag-TiO$_2$/UV



[illegible] t=Ĥĥġ min: [illegible]
Ag-TiO$_2$= ġ/Ĥg/L ،pH=Ĩ ،C$_0$= Ĥġġ mg/L



[illegible] Ag-TiO$_2$/UV [illegible] UV [illegible]
Ag-TiO$_2$= ġ/Ĥg/L ،pH=Ĩ ،C$_0$= Ĥġġ mg/L [illegible]

[illegible] TiO$_2$ P25 [illegible] XRD [illegible] Ag-TiO$_2$ [illegible] BET [illegible] TiO$_2$ [illegible] m^2/g [illegible] P25 [illegible] m^2/g [illegible]

[illegible] pH [illegible] Ag-TiO$_2$/UV

[illegible] pH [illegible] (pH = Ĩ [illegible] pH [illegible] pH [illegible]

pH (ĕĨĥ) > [illegible] pH (ĕĨĨ/Ĩ) > [illegible] pH (ĕĨġ)

[illegible] pH [illegible] TiO$_2$ [illegible] (TiOH) [illegible]

$$TiOH + H^+ \rightarrow TiOH_2^+ \longrightarrow pH < 6.25$$

$$TiOH \rightarrow TiO^- + H^+ \longrightarrow pH > 6.25$$

[illegible] pH [illegible] H$^+$ [illegible] TiO$_2$ [illegible] H$^+$ [illegible] H$_{ads}$^{0} [illegible] pH [illegible] pH [illegible] pH [illegible] Ranjit [illegible] M-TiO$_2$ [illegible] pH [illegible]

[illegible] Ag-TiO$_2$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

1. WHO. Guideline for Drinking Water Quality. 2nd ed. Geneva: World Health Organization; 1998.
2. AWWA. Water Quality and Treatment. 4th ed. American Water Works Association; 1990.
3. Nolen Bernard T. Relating nitrogen sources and aquifer susceptibility to nitrate in shallow ground water of the United States. Journal of Ground Water. 2001;39(2):290-9.
4. Kapoor A, Viraraghavan T. Nitrate removal from drinking water-review. Journal of Environmental Engineering. 1997;123(4):371-80.
5. Choe S, Chang YY, Hwang KY, Khim J. Kinetics of reductive denitrification by nanoscale zero-valent iron. Chemosphere. 2000;41(8):1307-11.
6. Rahmani AR, Samadi MT, Enayati Movafagh A. Investigation of photocatalytic degradation of phenol by UV/TiO_2 process in aquatic solutions. Journal of Research in Health Sciences. 2009;8(2):48-51.
7. Nazari R, Ebrahimie Tajabadi M. Titanium dioxide nanoparticles and applications in remediation of environmental pollutants. Proceeding of 4th Islamic Republic of Iran's National Biothechnology Conference; Kerman, Iran; 2005.
8. Hemmati Borji S, Nasseri S, Nabizadeh R, Mahvi AH,

Javadi AH. Photocatalytic degradation of phenol in Aqueous Solutions by Fe(III)-doped TiO_2/UV Process. Journal of Health & Environment. 2011;3(4):369-380 (in Persian).

9. Sa J, Aguera CA, Gross S, Anderson JA. Photocatalytic nitrate reduction over metal modified TiO_2. Journal of Applied Catalysis B: Environmental. 2009;85(3-4):192–200.
10. Van Grieken R, Marugan J, Sordo C, Martinez P, Pablos C. Photocatalytic inactivation of bacteria in water using suspended and immobilized silver-TiO_2. Journal of Applied Catalysis B: Environmental. 2009;93(1-2):112-8.
11. Rengaraj S, Li XZ. Enhanced photocatalytic reduction reaction over Bi^{3+}-TiO_2 nanoparticles in presence of formic acid as a hole scavenger. Chemosphere. 2007;66(5):930–8.
12. Sobana N, Muruganadham M, Swaminathan M. Nano-Ag particles doped TiO_2 for efficient photodegradation of direct azo dyes. Journal of Molecular Catalysis A: Chemical. 2006;258 (1-2): 124-32.
13. Tryba B, Piszcz M, Morawski AW. Photocatalytic and self-cleaning properties of Ag-doped TiO_2. Journal of Open Materials Science. 2010;4(2):5-8.
14. Shirzad Siboni M, Samadi MT, Rahmani A, Khataee A, Bordbar M, Samarghandi MR. Photocatalytic removal of hexavalet chromium and divalent nickel from aqueous solution by UV irradiation in the presence of titanium dioxide nanoparticles. Iranian Journal of Health and Environment .2010;3(3):261-70 (in Persian).
15. Ghanbarian M, Nabizadeh R, Mahvi AH, Nasseri S, Naddafi K. Photocatalytic degradation of linear alkyl benzene solfunate from aqueous solution by TiO_2 nanoparticles. Iranian Journal of Health and Environment .2011;8(4):309-16 (in Persian).
16. Behnajadi MA, Modirshahla N, Shokri M, Rad B. Enhancement photocatalytic activity of TiO_2 nanoparticles by silver doping: Photodeposition versus liquid impregnation methods. Global Nest Journal. 2008;10(1):1-7.
17. APHA. AWWA. WEF. APHA. Standard Methods for the Examination of Waters and Wastewaters. 21st ed. Washington, DC: American Public Health Association (APHA); 2005.
18. Shaygani Madad M, Jaleh B, Ashrafe Gh. The effect of thermal operation and particle size on TiO2 nanoparticle phase changes. Majlesi Journal of Materials Engineering. 2011;4(4):51-7.
19. Li Y, White TJ, Lim SH. Low temperature synthesis and microstructural control of titania nano-particles. Journal of Solid State Chemistry. 2004;177(4-5):1372-81.
20. Ranjit KT, Viswanathan B. Photocatalytic reduction of nitrite and nitrate ions to ammonia on M/TiO_2 catalysts. Journal of Photochemistry and Photobiology A: Chemistry. 1997;108(1):73-8.
21. Yang L, Yu LE, Ray MB. Degradation of paracetamol in aqueous solutions by TiO_2 photocatalysis. Water Research. 2008;42(13):3480-8.
22. Mahvi AH, Ghanbarian M, Nasseri S, Khairi A. Mineralization and discoloration of textile wastewater by TiO_2 nanoparticles. Desalination. 2009;239(1-3):309-16.
23. Sobczynski A, Duczmal L. Photocatalytic destruction of catechol on illuminated titania. Journal of Reaction Kinetics and Catalysis Letters. 2004;82(2):213-8.
24. Kashif N, Ouyang F. Parameters effect on heterogeneous photocatalysed degradation of phenol in aqueous dispersion of TiO_2. Journal of Environmental Sciences. 2009;21(4):527-33.
25. Guo Z, Ma R, Li G. Degradation of phenol by nanomaterial TiO2 in wastewater. Chemical Engineering Journal. 2006;119(1):55-9.
26. Damodar RA, Swaninathan T. Performance evalution of a continous flow immobilized rotating tube photocatalytic reactor (irtpr) immobilized with TiO_2 catalyst for azo dye degradation. Chemical Engineering Journal. 2008;144:59-66.

Photocatalytic Reduction of Nitrate in Aqueous Solutions using Ag-doped TiO_2/UV Process

Saeed Parastar[1], *Simin Nasseri[1], Amir Hossein Mahvi[1], Mitra Gholami[1], Amir Hossein Javadi[2], Saeedeh Hemmati[1]

[1]Department of Environmental Health Engineerinng, Faculty of Health, Tehran University of Medical Sciences, Tehran, Iran

[2] Institute of Engineering of Jihad Keshavarzi, Tehran, Iran

Received; 03 March 2011 Accepted; 28 May 2011

ABSTRACT

Background and Objectives: Pollution of water resources to nitrate is an environmental problem in many parts of the world. This problem possibly causes diseases such as methemoglobinemia, lymphatic system cancer and Leukemia. Hence, nitrate control and removal from water resources is necessary. Considering that application of nanomaterials in treatment of environmental pollutants has become an interesting method, in this research use of Ag-doped TiO_2 nanoparticles synthesized through photodeposition produced under UV irradiation was studied for removal of nitrate from aqueous solutions.

Materials and Methods: Three nitrate concentrations of 20, 50, and 100 mg/L were considered. In order to determine the effect of Ag-doped TiO_2 nanoparticles on nitrate removal, dosages of 0.1, 0.4, 0.8 and 1.2 g/L nanoparticles were used; pH range of 5-9 was also considered. The effect of Ag-doped TiO_2 nanoparticles both in darkness and under UV irradiation was studied. Moreover, the presence of chloride and sulfate anions on the system removal efficiency was investigated.

Results: The optimum performance of nitrate removal (95.5%) was obtained using nitrate concentration of 100 mg/L, in acidic pH and 0.8 g/L Ag-TiO_2. Increase of nanoparticle dosage up to 0.8 g/L, increased the removal efficiency, but for 1.2 g/L dosage of nanoparticles, the removal efficiency decreased. Maximum reduction performance without nanoparticles, under UV irradiation and under darkness conditions were 32% and 23.3% , respectively. In addition, we found that presence of sulfate and chloride anions in aqueous solution reduced efficiency of nitrate removal.

Conclusion: Results of this study showed that Ag-doped TiO_2 nanoparticles may be efficiently used for nitrate removal from aqueous solutions.

Keywords: Photocatalytic reduction, Ag-doped TiO_2, Nitrate, Aqueous solutions

***Corresponding Author**: *naserise@tums.ac.ir*

***Tel:** +98 21 88989133, **Fax:** +98 21 88989133*