

Advancements in Quantum Research

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Abstract²=LQFR[LGHSUWLFQHVZHUHV\QWKHVL]HGXLVQJWKHVROJHO PHWKRGDQGGLSFRDWHGRQSRO\HVWHUIDEULF;UD\GLI IUDFWLRQ;5' DQDO\VLVUHYHDOHGDVLQJOHFU\VWDOSKDVHRI=Q2S DUWLFQHV&KHPLFDO FKDUDFWHULVWLFVRIWKHSRO\HVWHUIDEULFVXUIDF HZHUHLQYHVWLJDWHGXVLQJ DWWHQXDWHG WRWDO UHIOHFWRQ)RXULHU WUDQVIRUP LQIUDUHGS75)7,5 PHDVXUHPHQWVORUSKROR\RI=Q2FRDWHGIDEULFZDV DQDO\JHGXLVQJ ILHOGHPLVLRQVFDQQLQJHOHFWURQPLFURVFRS\)(6(0 \$IWHUSDUWLFQHV DQDO\VLV WKH DTXHRXV =Q2 VROXWLRQ UHVXOWHG LQ D QDUURZ VLJH GLVWULEXWLRQ DW VXEPLFURQ OHYHOV 7KH GHSRVLW RI =Q2 RQ SRO\HVWHU IDEULFV\HOGHGDKRPRJHQHRXVVSUHDGRIVSKHULFD OSDUWLFQHV(QHUJ\ GLVSHUVLYH ;UD\ VSHFWURVFRS\('; UHVXOWV DOVR DIILUPHG WKH SUHVHQFHRI=Q2SDUWLFQHVVRQWKHSRO\HVWHUIDEUL FV

FRDWLQJZLWKS\VLFDOSURSHUWLHVIRUGHVLUDE OHPXOWLIXQFWLRQDO WH[WLOHSURGXFWV6ROJHOV\QWKHVLVRI=Q2SDUW LFOHVXVLQJ]LQF VDUWUHVXOWVLQDUDSLGUHDFWLRQDWORZWHPS HUDWXUHVVDQGD QDUURZVLJHGLVWULEXWLRQRISDUWLFQHVZLWKO DUJHVXUIDFHDUHD SURSHUWLHV'XHWRWKHWHPHUDWXUHVHQVLWL YLW\RIWH[WLOHIDEULFV DORZWHPSHUDWXUHVHDFWLRQSURFHVVLVYHU\G HVLUDEOHWKXV PDNLQJGLSFRDWLQJJDVXLWDEOHPHWKRGRIRUVXUID FHFrdwLQJRI SRO\HVWHUILEHUV,QWKLZRUN=Q2SDUWLFQHVZH UHV\QWKHVL]HG XLVQJWKHVROJHOPHWKRGWKDWLQYROYHVWKHG LSFRDWLQJRI SRO\HVWHUIDEULFVXUIDFHV

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0 / gYHoR+OX LV ZLWK ,VWDQEXO 7HFKQLFDO 8QLYHUVLW\ 'HSDUWPHQW RI 0HWDQOXUJLFDQ DQG 0DWHULDOV (QJLQHHLQJ 3DUWLFXODWH 0DWHULDOV /DERUDWRULHV 30/,VWDQEXO7XUNH\HPDLORYHFRJOX#JPDLOFRP

7KLV VWXG\ ZDV ILQDQLFDOO\ VXSSRUWHG E\ μ,VWDQEXO 7HFKQLFDO 8QLYHUVLW\

6FLHQWLILF5HVHDUFK3URMHFW\ PRGLLFDWLRQRILEHUVXUIDFHV7KLVPHWKRGRSUR YLGHVDVXUIDFH

A. Materials

,QWKLVVWXG\XQG\HGSRO\HVWHUIDEULFZDVREW DLQHG IURPDORFDQHUWDLQHU=LQFDFHWDWHGLK\GUDW HWULHWLQDPLQD LVRSURS\ODOFKRROVRGLXPK\GUR[LGHFLWULFDL G7ULWRQ; ZHUHVXVHGIRUFKHPLFDQHUHDFWLRQV\$OOWKHFKHP LFDQVDDQGD UHDIHQVWZHUHRIDQDO\WLFDOJUDGHV7KHSRO\HV WHUIDEULFVZHUH XVHGDIWHUEHLQJWUHDWHGZLWKDZDVKLQJVROX WLRQRJID2+ GLVVROYHGLQPOGLVWLOOHGZDWHUZLWKJ7ULWR Q; DQGJFLWULFDLFDGGHGLQWKHUHVXOWLQJVROX WLRQ7KH ZDVKLQJRIWKHSRO\HVWHUIDEULFVDPHOVZDVSH UIRUPHGZLWKD OLTXRU WR JRRGV UDWLR RI 7KH IDEULF VDPHOV ZHUH LPPHUVHGLQWRWKHVROXWLRQDQGPL[HGZLWKDP DJQHWFPL[HU DWq&IRUK\$IWHUULQVLQJZLWKGLVWLOOHGZDWHU WKHIDEULF VDPHOVZHUHGULHGLQURRPFRRQGLWLRQV

B. Synthesis of ZnO Particles

=Q2SDUWLF0HVZHUHV\QWKHVLJHGXLVQJWKHVR
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SURS\O
DOFRKRODQGPL[HGZLWKDPDJQHWFPL[HUDQGKHD
WHGJUDGXDOO\ WR
q&\$WWKLVWHPSHUDWXUHPORIWULHWLQDPLQZDV
LQVWLOOHGLQWKHVROXWLRQ7KHUHVXOWLQJVR
OXWLRQZDVPLJHGIRU
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ROLQURRP
FRQGLWLRQV\$IWHUDGGLQJWULHWLQDPLQWKHVR
OXWLRQDWWDLQHG
WUDQVSDUHQWIRUPDQG=Q2SDUWLF0HIRUPDWLRQ
ZDVREHVUYHG JUDGXDOO\LQWLP

C. Coating of Polyester Fabrics with ZnO

3RO\HVWHUIDEULFVDPHVRIFPFLQVLJHZHUHG
LS
FRDWHG7KHIDEULFZDVLPPHUVHGLQWRWKHVROX
WLRQIRU
PLQXWHVDQGWKHQGLHGLQDQRYHQIRUPLQXWHV
DWq&
7KLVSURFHVZDVUHSHDWHGWZLFHDQGWKHQWK
HIDEULFVDPHVR
FXUHGDWq&IRUK

D. Characterization

7KHFKDUDFWHULJDWLRQPHWKRGSURYLGHGW
KHDQDO\VLVRIWKH
V\QWKHVLJHG=Q2SDUWLF0HVDQGWKHVXUIDFHF
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)6(0LPDJHVREWDLQHGZLWKD1RYD1DQR6(07KH
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HDVXUHGE\(';
FRXSOHGWR)(6(07KH)7,5VSHFWUXPZDVUHFUGHG
RQ%UXNHU 70 \$OSKD7 \$75)7,5
VSHFWURSKRWRPHWHU 7KH
DQDO\VLVFRQGLWLRQVZHUHVHWDVUHVROXWL
RQFPDQGD
IUHTXHQFUDQJH±FP7KHVWUXFWXUHRIWKH=Q2
SDUWLF0HVZHUHFKDUDFWHULJHG=5%UXNHU□
'SGYDQFHG
6HULHVVSFWUDZLWK&X.JUDGLDWLRQ3
QPN9DQG
P\$LQWKH\$UDQJHRI±ZLWK□PLQVFDQUDWH

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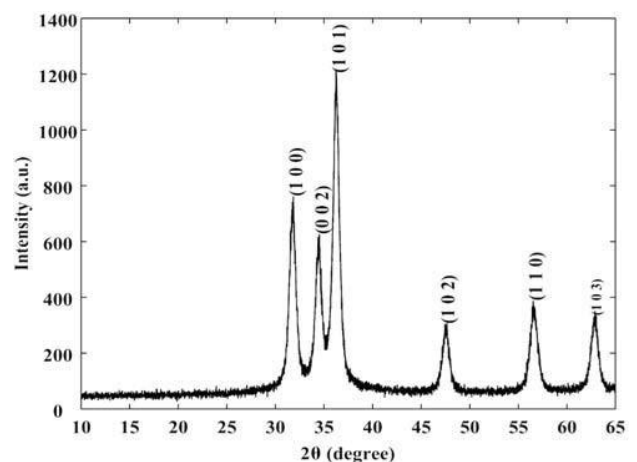
A. Particle Size Analysis of ZnO Particles Using Dynamic Light Scattering (DLS) Technique

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VV\$YHVDJH=Q2
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V
=Q2VROXWLRQ7KH3',YDOXHLP\$UWVDPRQRGLVSH
UVH=Q2
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KRPRJHQLW\ RI WKH SDUWLF0

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6WHFKQLTXH

B. XRD Analysis of ZnO Particles

SURFHVREWDLQLQJVLQJOHFU\VWDO=Q2SDUWLF0
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LEOH



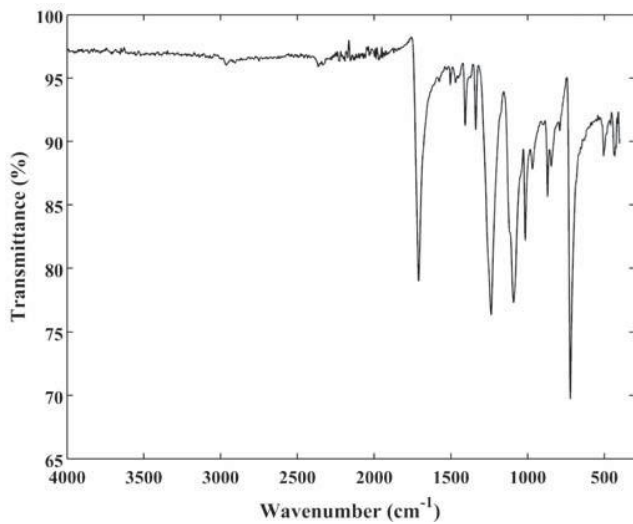
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C. ATR-FTIR Analysis of Pristine and ZnO Coated

Polyester Fabrics

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 \HVWHU
 DQG=Q2FRDWHGSRO\HVWHUIDEULFV)LJDGHSLFVW
 WKH
 FKDUDFWHULVWLFSDNYDOXH7KHVKDUSHDND
 WFPLV
 GXHWRWKHVWUHWFKLQJYLEUDWLRQRIWKHHVWH
 UJURXS& 27KH
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 EHWZHHQ
 FPFPUHGXHWWRWKHVWUHWFKLQJSHDNVRI&2
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 &+EHQGLQJDQGRXWRISODQH&+&+ &+
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 DWFP
 EHQGLQJ

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 WHGSRO\HVWHUIDEULFV
 FDQEHVHHQLQ)LJ7KH(';VSHFWUXPRISRO\HVWHU
 IDEULF
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 QHOHPHQWV7KH
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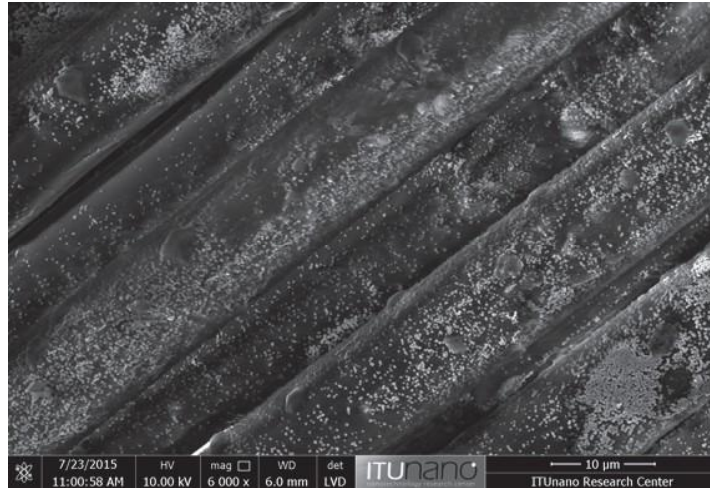
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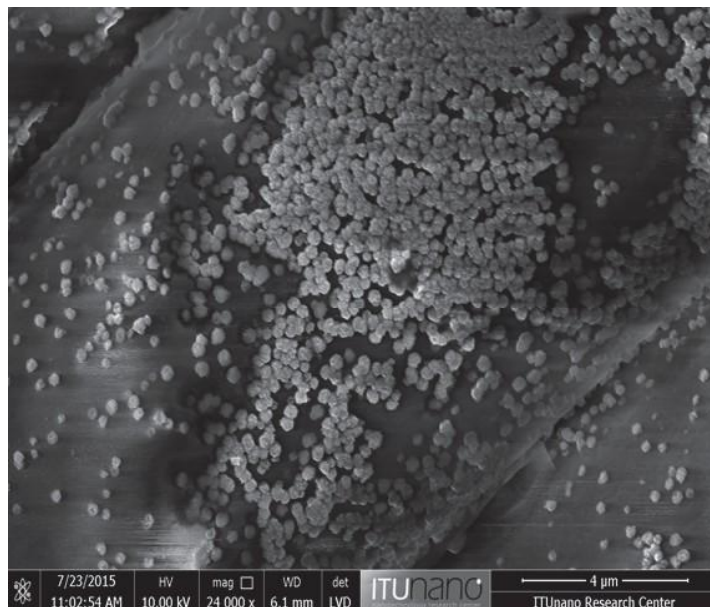
D. Surface Morphology and EDX Analysis Pristine and ZnO Coated Polyester Fabrics

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 DEULFDQG=Q2
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 HGXVLQJ)(6(0LQ
)LJ*URRYHVDQGILEHUVRQWKHVXUIDFHRIWKHS
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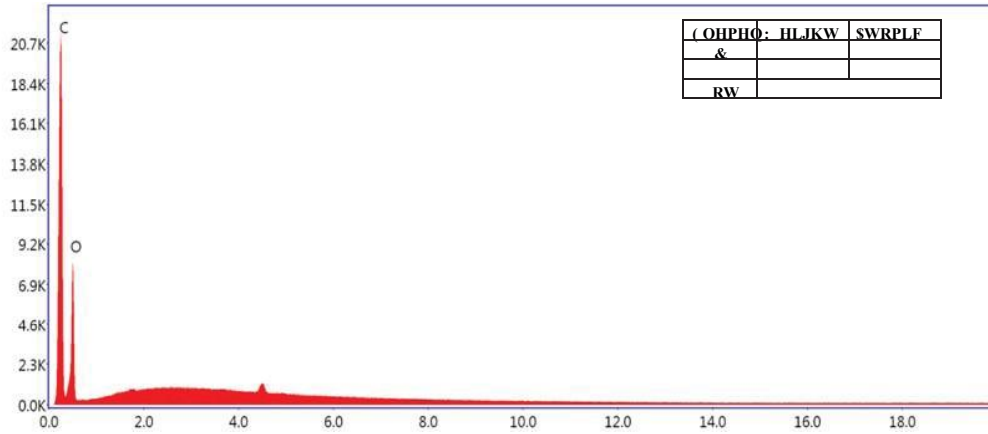


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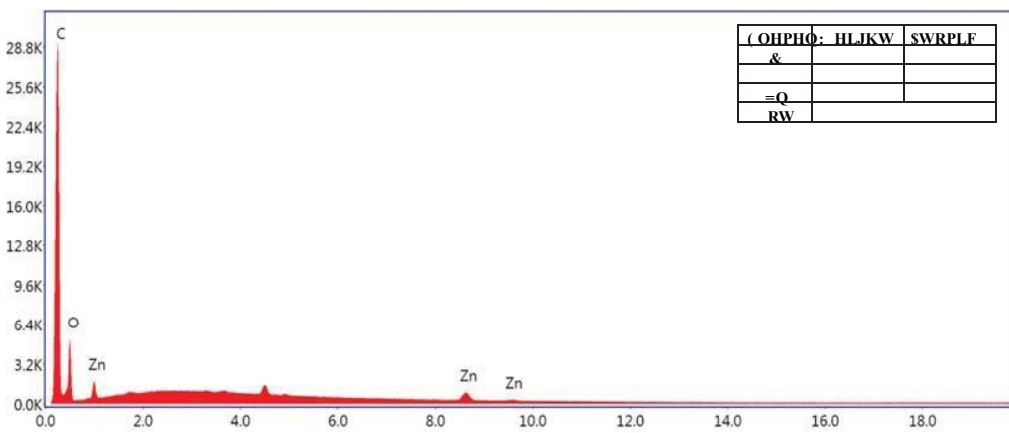


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VRIFU\VWDO
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JHGLVWULEXWLRQRIWKH
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DFWLYLW\ -RXUQDO RI
3KRWRFKHPLVWU\DQG3KRWRRELROJ\&KHPLVWU\SS
RI3KRWRFKHPLVWU\DQG3KRWRRELROJ\&KHPLVWU\SS

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