

University of Missouri-University of the Western Cape  
Linkage Program 2017 Report

Candidate: Prof. Suchi Guha

Home Institution: Department of Phys 4(tC4( )4(of )3(Ph12(id)52(d A)10(strontC4omy14

2EMHFWLYH RI 9LVVLW

7KH REMHFWLYH RI WKH YLVLW ZDV WR LQLWLDWH D UHVHD  
UHVHDUFK JURXS DW WKH 8QLYHUVLW\ RI OLVVRXUL &ROXPELD  
RUJDQLF EDVHG PDWHULDOV IRU HOHFWURQLFV RYHU WKH OD  
LQRUJDQLF DQG RUJDQLF VHPLFRQGXFWRUV KDV WKH SRWHQV  
HIILFLHQF\ DQG FRVW 7KH JURZWK RI LQRUJDQLF VHPLFRQG  
FKDUDFWHULJDWLRQ FDSDELOLWLHV DW WKH 8QLYHUVLW\ RI :HV  
WR RXU SURMHFW \$ORQJ ZLWK WKH UHVHDUFK SURMHFW , ZDV  
1DQRVFLHQFH *0DWHULDOV Science and Engineering in Nanomaterials* 7KLV FRXUVH ZD  
WHDP WDXJKW E\ 3URI &DUVWHQ 8OOULFK 08 ZKR YLVLWHG 8:

6SHFLILF REMHFWLYHV RI WKH UHVHDUFK YLVLW LQFOXGHG  
D&KDUDFWHULJDWLRQ RI SRO\PHU IHUURHOHFWULF ILOPV XVL  
DW 8:&  
E6\QWKHVLV RI QDQR SDWWHUQH =Q2 ILOPV IRU K\EULG SKR  
F&KDUDFWHULJDWLRQ RI =Q2 ILOPV XVLQJ [ UD\ SKRWRHOHFV  
,QVWLWXWH RI 6RXWK \$IULFD 10,6\$ LQ 3UHWRULD  
G3ODQQLQJ RI D QHZ SURMHFW LQYROYLQJ RUJDQLF LQRUJD  
IXQGDPHQWDO HOHFWURQLF DQG PDJQHWLF SURSHUWLHV D

\$FFRPSOLVKHG :RUN 5HVHDUFK

D



7KH LPDJHV DERYH FOHDUO\ VKRZ WKH FKDQJHV LQ WKH GRPD  
LPDJHV ZH FDQ ILQDOO\ FRUUHODWH RXU HOHFWULFDO SURSHU  
GLHOHFWULF OD\HU :H DUH LQ WKH SURFHVV RI SUHSDULQJ D P

HIILFLHQFLHV XSZDUG RI &9' JURZWK RI SHURYVNLWH ILOPV  
\$UHQQGVH DQG KLV WHDP ZLOO EH DW WKH IRUHIURQW RI VXFK J  
WR WKHLU DSSOLFDWLRQ LQ VRODU FHOOV RUJDQLF LQRUJDQL  
EDVLF SK\VLFDQ SKHQRPHQD SUHVHQFH RI IHUURHOHFWULFLW  
ZKLFK DUH WXQDEOH ZLWK H[WHUQDO SHUWXUEDWLRQ  
,Q IDOO , ZLOO VXEPLW D SURSRVDO WR WKH 1DWLRQD  
IXQGDPHQWDO SURSHUWLHV RI SHURYVNLWH XVLQJ H[WHUQDO  
ZLWK 3URI \$UHQQGVH

7HDFKLQJ DW 8:&

7KH 0DVWHU RI 6FLHQFH 06F WZR \HDU GHJUHH LQ 1DQRVFLH  
FRODERUDWLYH LQLWLDWLYH EHWZHHQ 8:& 8QLYHUVLW\ RI -I  
8)6 WKH 1HOVRQ 0DQGHOD 0HWURSROLWDQ 8QLYHUVLW\ 100  
7HFKQRORJ\ ,W LV VSHDUKHDGHG E\ 8:& DQG FRRUGLQDWHG  
EHWZHHQ WKHVH LQVWLWXWLRQV DOORZV VWXGHQWV IURP RW  
8:& 7KLV \HDU KDV EHHQ RQH RI WKH ODUJHVW HQUROOPHQWV  
VWXGHQWV LQ WKH LQWURGXFWRU\ \HDU

3URI&DUVWHQ 800ULFK DQG , WHDP WDXJKW D FRXUVH RQ  
1DQRPDWHULDOV' RYHU WZR ZHHNV 7KH FRXUVH ZDV RIIHUG  
KRXU DQG 3URI 800ULFK WDXJKW IRU DQRWKHU KRXU 7KH WRS

x	■	x	7LPH GHSHQQGHQW '7 DQG H
	■		H[FLWDWLRQV
x	(OHFWURQLF EDQG VWUXFWXU	x	■
x	,QWURGXFWRQ WR WKH HOHFWURQDWRUQ LQ PDWHULDO	x	■
	ERG\ SUREOHP		DQG SODVPRQV
x	■	x	■
x	■		■
	■	x	*UDSKHQH
x	'HQVLW\ IXQFWLRQDO WKHRU\ DQG	x	■
	PRGHUQ FRPSXWDWLRQDO x		■
	VFLHQFH ,		■
x	■		■
x	'HQVLW\ IXQFWLRQDO WKHRU\ DQG		■
	PRGHUQ FRPSXWDWLRQDO PDWHULDOV		■
	VFLHQFH		■

LQROGH WKH WRSLFV FRYHUHG E\ \*XKD

7KH OHFWXUHV ZHUH EDVHG RQ SUHVHQWDWLRQ VW\OH ZLWK  
RQ KRPHZRUN DVVLJQPHQWV DQG D VKRUW LQ FODVV WHVW

2WKHU 5HVHDFK 9LVLWV LQ 6RXWK \$IULFD

:H JRW WKH RSSRUWXQLW\ WR YLVLW RWKHU UHVHDFK IDFL  
1008 LQ 3RUW (OL]DEHWK 5HVHDFK DFWLYLWLHV DW WKH ,7K  
DFHODUDWRUV ,W DOVR KDV D VWURQJ IRFXV RQ PDWHULDOV  
WKHLU UHVHDFK IDFLOLWLHV

7KH YLVLW WR 1108 LQ 3RUW (OL]DEHWK ZDV RUJDQL]HG E\ 3U  
7KH HOHFWURQ PLFURVFRS\ IDFLOLW\ DW 1108 LV D ZRUOG FOD  
RI WKH DUW HOHFWURQ PLFURVFRSHV :H SURIRXQGO\ WKDQN 3U  
PLFURVFRS\ FHQWHU DQG RWKHU IDFXOW\ PHPEHUV RI WKH SK  
UHVHDFK DFWLYLWLHV DQG JLYLQJ XV D WRXU RI WKHLU ZRUOC

9DOXH RI WKH 80 8:& ([FKDQJH 3URJUDP

\$W D SHUVRQDO OHYHO WKLW H[FKDQJH SURJUDP KDV EHHQ H  
RQ QHZ UHVHDFK SURMHFWV LQ WKH DUHD RI VXVWDLQDEOH F  
08 ZH RQO\ JDLQ IURP WKLW H[FKDQJH SURJUDP 7KH 1DWLRQ  
\$IULFD KDV UHFHQWO\ UDQNHG 8:& DV WKH WRS PRVW 3K\VLV  
WHUPV RI PDWHULDOV VFLHQFH QDQRVFLHQFH FDSDELOLWLHV  
H[SHUWLHV DQG UHVHDFK FDSDELOLWLHV 7KH QHZ WKLQ ILOP  
VHYHUDO GRRUV IRU UHVHDFKHUV OLNH PH ZKR DUH LQYROY  
XWLOL]LQJ QRYHO VHPLFRQGXFWLQJ DQG PHWDOOLF ILOPV LQ H

0\ FXUUHQW 16) IXQGLQJ ZLOO DOORZ PH WR WDUJHW VSHFLD  
'HYHORSPHQW 86\$,' WR VXSSRUW 3DUWQHUVKLSV IRU (QKDQFH  
\$IULFD 7KH H[SHULHQFH JDLQH DQG SUHOLPLQDU\ GDWD JDW  
H[WUHPHO\ EHQHILFLDO IRU HVWDEOLVKLQJ MRLQW UHVHDFK S  
RI 'UV 0XOOHU DQG \$UHQQVH :H HQYLVDJH D PRUH LQYROYHG  
H[FKDQJHV

\$FNQRZOHGJHPHQWV

,Q DGGLWLRQ WR WKDQNLQJ WKH ILQDQFLDO VXSSRUW IURP V  
DQG WKH 2IILFH RI WKH 3UHVVLGHQW DW 80 IRU KHOS ZLWK WUD  
WKDQN 3URI &KULV \$UHQQVH DQG KLV ZLIH 5RFKHOOH 'UV 7K  
DSSUHFLDWH WKHLU XQOLPLWHG KRVSLWDOLW\ GXULQJ RXU YLV  
VWDII IRU KHOSLQWV D ZLWLG RXU WKDQ DOO WKH RWKHU PHPEH

