

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

Candidate: Prof. Suchi Guha

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 *0DWHULDO Science and Engineering in Nanomaterials* 7KLV FRXUVH ZD
WHDP WDXJKW E\ 3URI &DUVWHQ 80OULFK 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\ SKRWRHOHFW
,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 -
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 80OULFK DQG , WHDP WDXJKW D FRXUVH RQ
1DQRPDWHULDOV' RYHU WZR ZHHNV 7KH FRXUVH ZDV RIIHUG
KRXU DQG 3URI 80OULFK WDXJKW IRU DQRWKHU KRXU 7KH WRS

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

LQROGH WKH WRSLFV FRYHUG 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 \$UHQQGHV :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 \$UHQQGHV DQG KLV ZLIH 5RFKHOOH 'UV 7K
DSSUHFLDWH WKHLU XQOLPLWHG KRVSLWDOLW\ GXULQJ RXU YLV
VWDII IRU KHOSLQWV D ZLWGHV RXU WKDQ DOO WKH RWKHU PHPEH

