



- % 5 - RXUQDO RI , QWHUGLVFLSOLQDU
0HGLFLQH DQG 'HQWDO 6FLHQFH

(GLWRULDO

2SHQ \$F

1RUKD\DWL /XGGLQ

'HSDUWPHQW RI 'HQWLVWU\ 8QLYHUVLWL 6DLQV 0DOD\VLD 0DOD\VLD

&RUHVSRQGLQJ RI 'HQWLVWU\ 6FKRRO RI 'HQWDO 6FLHQ
.XEDQJ .HULDQ .HODQWDQ 0DOD\VLD 7RUKD\DWLOXG(FLD)PDLO FRP

5HF GDWH 6HS \$FF GDWH 6HS 3XE GDWH 6HS

&RSULJKW /XGGLQ 1 7KLV LV DQ RSHQ DFFHVV DUWLFOH GLVWULEXWHG XQGHU WKH WHUPV RI WKH &
GLVWULEXWLRQ DQG UHSURGXFWRQ LQ DQ\ PHGLXP SURYLGHG WKH RULJLQDO DXWKRU DQG VRXUFH D

(GLWRULDO

*OD, RQR RHHU PHQW *, & LV RQH RI WKH WRRQYHQWLRQDO *, & KRROGAS BLSURPLVH
DPRQJ WKH DYDLODEOH GHQWDO UHVWUDLQV DPHWLRQDOLWYH PDWHUL
SURSHUWLHV OLNH GLUHFWDGKHLVLRQV WR WKH WKLJKDYH GHVLJQ
FRPSDWLELOLW\ > @ DQG JRRG ELRFREDFWLRQV 'HVSLWH WKHVH
DGYDQWDJHV EULWWOHQHVV ORZ WHQVLOH DQG IOHXUDO VWUHQJWKV KDYH O
WKHLU XVH RQ\ WR FHUWDLQ ORZ VWUHQJWKV VLWV \$V VXFK WKH
LQFRUSRUDWLRQ RI PLFURQ UDQJH VL]HG SDUWLFOHV VXFK DV DOXPLQD
]LUFRLD RU JODVV ILEHUV LQWR &*, & V DUHLVSPH RI WKH WKLJKDYH
WR LPSURYH WKH PHFKDQLFDO VWUHQJWKV WR WKLJKDYH WHUHQVWV PDGH
QRW VLJQLILFDQWO\ LPSURYH LWV PHFKDQLFDO WUHQVWV +HEOLQJ - *DUFLD *RGR

+IGUR[\DSDWLWH LV D QDWXUDO\ RFFXUULQJ LQ IRUP RI FDOFLXP 6DL
7KHVH GD\V QDQRKIGUR[\DSDWLWH KDV HYDQDWRQ RYH ILEHUVV WKLJKR\ YL
GHQWDO ELRPDWHULDOV WR LPSURYH LWV PHFKDQLFDO WUHQVWV OLNH WKH
FRPSUHVVLYH VWUHQJWK GLDPHWUDO WUHQVWV WKH WKLJKDYH WHUHQVWV OLNH WKH
> @ WRXJKQHV ERQGLQJ DQG IOXRULGHV UHQDWR SURSHUWLHV WR LPSURYH WKH
UHSRUWHG DIWHU WKH DGGLWLRQ RI +\$ LQWR WKH WUHQVWV WKH WUHQVWV WUHQVWV
VWXGLHV KDYH EHHQ FRQGXFWHG LQ 6FKRRO RQ LQWHUQDQW WUHQVWV WUHQVWV
6DLQV 0DOD\VLD 860 WR LPSURYH WKH WUHQVWV WUHQVWV WUHQVWV WUHQVWV
QDQR KIGUR[\DSDWLWH WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
WHFKQLTXH > @ DQG LQFRUSRUDWHG LQWR WKH WUHQVWV WUHQVWV WUHQVWV WUHQVWV
)XML ; *3 * & , QWHUQDWRQD -DSDQ WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
QDQR +\$ VLOLF LQWR & * LQFUDV LQ WKH WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
&*, & E\ FRPSDUHG WR WKH XVH RI FRQYHQWLRQDOLWYH WUHQVWV WUHQVWV WUHQVWV
LV EHOLHYHG WKDW WKH QDQR VLOLF WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
KH[DJRQDO +\$ SDUWLFOHV DQG VXEVIHXYH WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
GHQVLW\ WKXV LQFUHDVH LWV KDUGQHVV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
7UDQVPLVVLRQ (OHFWURQ OLFURVFRSH WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
OLFURVFRSH 6(0 PLFURJUDSKV ZKLFK WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
WKH HORQJDWHG +\$ DQG VSKHULFDO VLQDWRQ WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
RI WKHP ZHUH LQ QDQR VL]HG SDUWLFOHV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
VSLQQLQJ QXFOHDU PDJQHWLF UHVRQDQJ WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
SUHVHQFH RI KLJK GHUHH RI FURVV OLQNLQJ LQ WKH WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
7KLV FURV OLQNLQJ LV EHOLHYHG WR 6RQBNKDSLSLQ LQ WKH WUHQVWV WUHQVWV WUHQVWV WUHQVWV
PDNLQJ WKH +\$ WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV WUHQVWV
&*, & > @ FRPSVLWH 6RO JHO \IQWKHVLV DQG FKH

:LWKLQ WKH OLPLWDWLRQ RI WKHVH VWXGLHV WKH LQYHVWLJDWLRQV RQ +\$
6L2*, & GHPRQVUDWHG VRPH IDYRXUDEOH UHVXOWV \$PRQJ WKHVH LQFOXGH