Supplementary Information (SI) for Nanoscale.
This journal is © The Royal Society of Chemistry 2024

Supplementary Information

Manipulation of Trions to Enhance the Excitonic Emission in Monolayer p-MoS_2 and its Hetero-bilayer by Reverse Charge Injection

Rashed H. Lone[1,2+*], Shreya Gaonkar[1+], B. Manoj Kumar[1], and E. S. Kannan[1,]

[1]Department of Physics, BITS-Pilani K. K. Birla Goa Campus, Zuarinagar, Goa-403726, India.
[2]Functional Materials and Microsystems Research Group and the Micro Nano Research Facility, RMIT University, Melbourne, Victoria 3000, Australia
[*]rashedlone55@gmail.com
[+]these authors contributed equally to this work

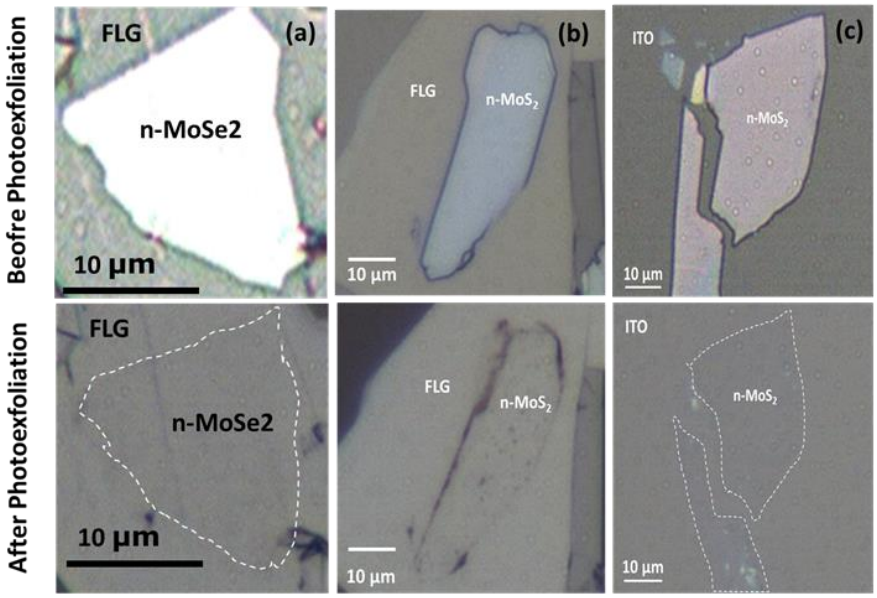
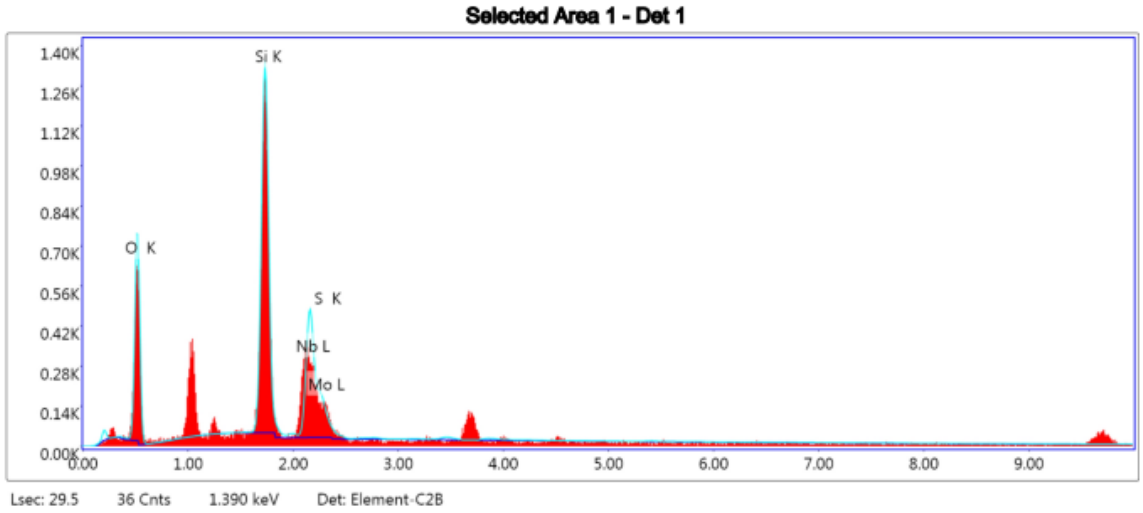


Figure S1. Optical images of n-$MoSe_2$ and n-MoS_2, before and after photo-exfoliation on various substrates.



eZAF Smart Quant Results

Element	Weight %	Atomic %	Net Int.	Error %	Kratio	Z	A	F
O K	45.4	69.6	149.2	10.8	0.1081	1.1111	0.2142	1.0000
SiK	26.4	23.0	372.9	4.5	0.2072	1.0174	0.7686	1.0048
NbL	26.7	7.0	135.1	5.7	0.1814	0.7880	0.8638	0.9995
MoL	1.5	0.4	7.4	42.9	0.0100	0.7795	0.8472	0.9992
S K	0.0	0.0	0.0	100.0	0.0000	0.9981	0.7233	1.0015

Figure S2. Presence of Niobium in p-type MoS_2 is confirmed by Electron Dispersive Spectrum (EDS).

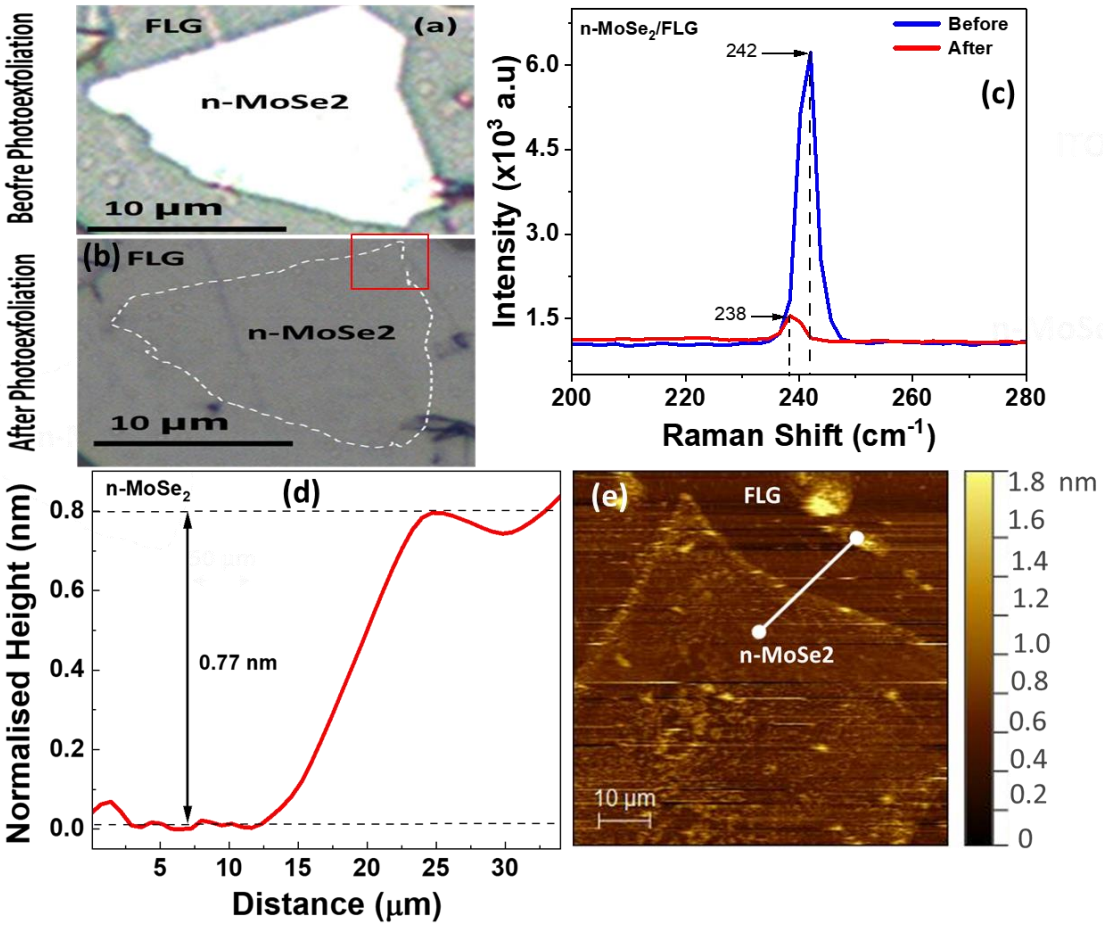


Figure S3. Optical image of n-$MoSe_2$ on FLG substrate (a) before and (b) after photo-exfoliation. (c) Raman spectra of n-$MoSe_2$ on FLG, before (solid blue line) and after (solid red line) photo-exfoliation. (d) Height profile and (e) AFM image of monolayer n-$MoSe_2$.

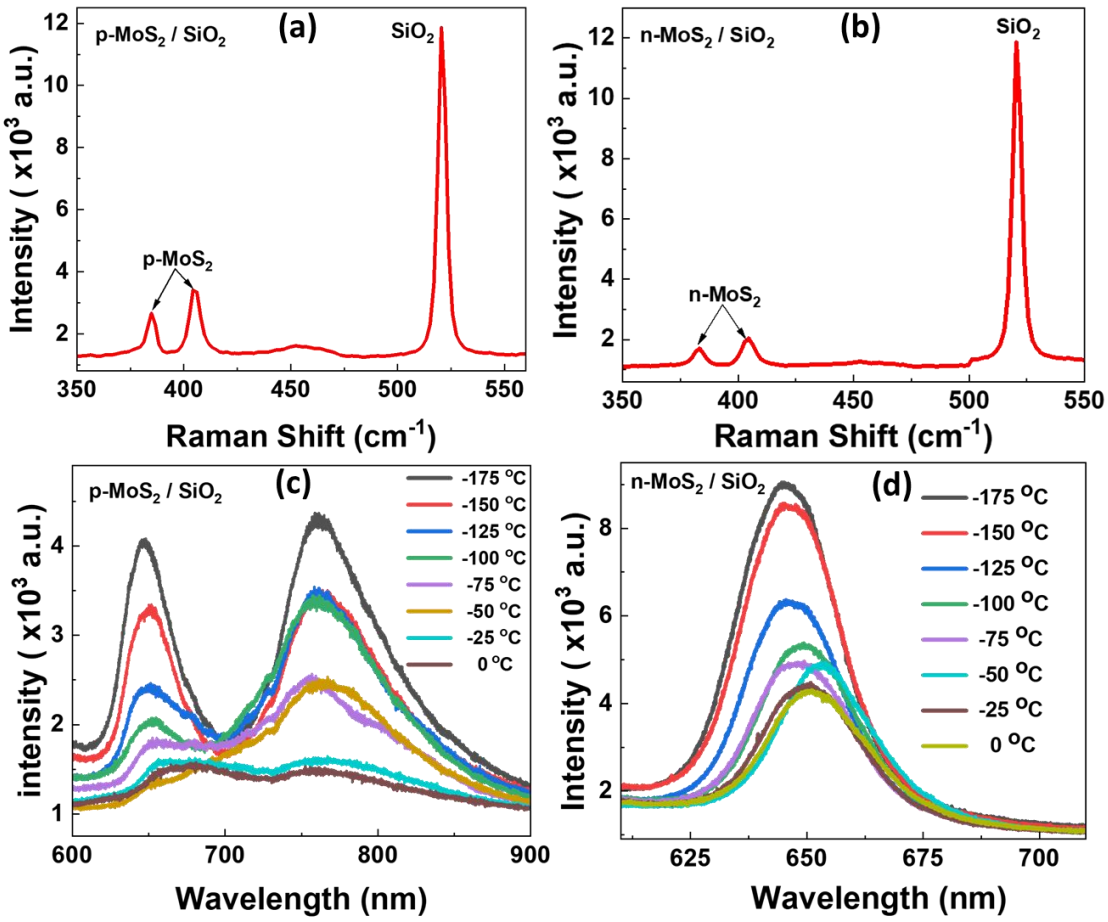


Figure S4: Raman spectra on SiO_2/Si substrate of (a) p-MoS_2 and (b) n-MoS_2. Temperature dependent PL spectra on SiO_2/Si substrate of (c) p-MoS_2 and (d) n-MoS_2.

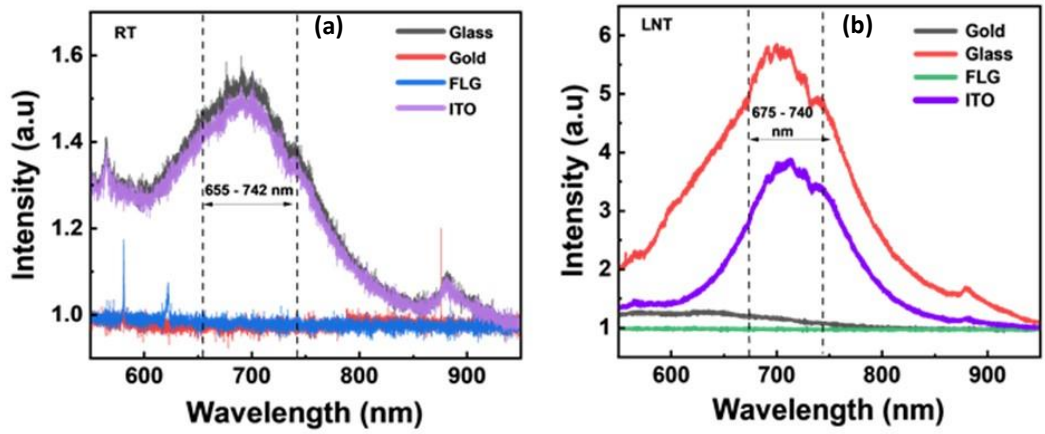


Figure S5. PL spectra of glass (solid black), gold (solid red), FLG (solid blue) and ITO (solid violet), depicting a same broad range of PL spectra in case of ITO and glass thus confirming that it originates from glass substrate at (a) RT and (b) LNT.

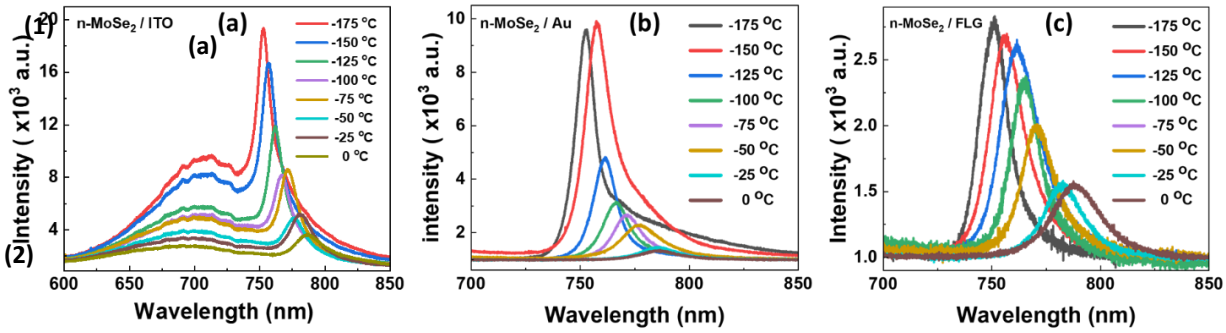


Figure S6: Temperature dependent PL spectra of n-$MoSe_2$ on (a) ITO, (b) Au and (c) FLG.