Electronic Supplementary Material (ESI) for RSC Advances.

Table 1. Calculated total energy of electrode, cohesive/formation energy and total energy of device.

Sr. No	Sample	Cohesive /Formation Energy (eV)	Total energy of electrode (eV)
1.	ASiNR	-6.1887	-5100.74
2.	In-ASiNR	-6.0409	-5480.691
3.	Ga-ASiNR	-6.0988	-5164.057
4.	Al-ASiNR	-6.1007	-5064.342
5.	Tl-ASiNR	-6.5664	-5488.235
6.	P-ASiNR	-6.1943	-5185.831
7.	As-ASiNR	-6.1737	-5247.364
8.	Sb-ASiNR	-6.1383	-5073.260
9.	Bi-ASiNR	-6.0952	-5621.744

Table 2. Comparison of shit in fermi level of p-type and n-type doped ASiNR along with pristine ASiNR.

Sr. No	**Sample**	**Type of Semiconductor**	**Fermi level (E_f)**	**Change in fermi level (Doped ASiNR(E_f)-ASiNR(E_f))**	**Shift in fermi level with reference to ASiNR**
1.	ASiNR	Semiconductor	-4.003	------	----
2.	Al- ASiNR	P-type	-4.182	-0.179	Downward
3.	Ga- ASiNR	P-type	-4.188	-0.185	Downward
4.	In- ASiNR	P-type	-4.189	-0.186	Downward
5.	Tl- ASiNR	P-type	-4.192	-0.189	Downward
6.	P- ASiNR	N-type	-3.847	0.156	Upward
7.	As- ASiNR	N-type	-3.830	0.173	Upward
8.	Sb- ASiNR	N-type	-3.798	0.205	Upward
9.	Bi- ASiNR	N-type	-3.785	0.218	Upward

Table 3. Comparison of current voltage characteristics for NDR behavior of p-type and n-type doped ASiNR along with pristine ASiNR.

Sr. No	Sample	Type of Semiconductor	Peak Current (Ip) in μA	Valley Current (Iv) in μA	Peak Valley Ratio (Ip/Iv)	Device Total Energy
1.	ASiNR	Semiconductor	--------	--------	--------	-15335.82
2.	Al-ASiNR	P-Type	5.460	3.660	1.491	-15262.67
3.	Ga-ASiNR	P-Type	7.066	2.844	2.484	-15462.16
4.	In-ASiNR	P-Type	7.626	2.467	3.091	-16095.42
5.	Tl-ASiNR	P-Type	8.260	2.840	2.908	-16110.52
6.	P-ASiNR	N-Type	1.118	8.751	1.277	-15505.76
7.	As-ASiNR	N-Type	1.965	1.558	1.261	-15628.83
8.	Sb-ASiNR	N-Type	3.617	1.836	1.970	-15280.64
9.	Bi-ASiNR	N-Type	4.592	1.754	2.617	-16377.63

Table 4. Comparison of current voltage characteristics with and without applied gate voltage.

Sr. No	Applied Gate Voltage (V)	Peak Current (Ip) in μA	Valley Current (Iv) in μA	Peak Voltage in V	Valley Voltage in V	(Ip/Iv) Ratio
1.	--	7.626	2.467	0.35	0.74	3.091
2.	-0.1	6.612	4.384	0.49	0.71	1.508
3.	0	6.921	4.220	0.49	0.76	1.639
4.	0.1	9.058	2.793	0.48	0.82	3.242
5.	0.2	8.020	1.742	0.47	0.82	4.603
6.	0.3	4.406	2.237	0.48	0.82	1.969
7.	0.4	3.451	3.157	0.58	0.76	1.093