# Supporting Information

## Search for Origin of Room Temperature Ferromagnetism Properties in Ni doped ZnO Nanostructure

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*Table S1. Refined structural parameters for $Zn_{1-x}Ni_xO$ ($0.0 \leq x \leq 0.125$) thin film (Error in $10^{-4}$ order in refined parameters).*

| ***Sample*** | ***Lattice parameters (Å)*** | ***Atoms*** | ***Positions*** | | | | ***Occ. Ratio (Zn/O)*** |
|---|---|---|---|---|---|---|---|
| | | | ***X*** | ***Y*** | ***Z*** | | |
| ZnO | *a= 3.2430 ±0.0002* | Zn | 2a | 0 | 0 | 0.9938 | 0.5549 |
| | *c=5.1953±0.0001* | O | 2b | 0.3333 | 0.6667 | 0.3473 | |
| ZnO:Ni5% | *a= 3.2513±0.0002* | Zn/Ni | 2a | 0 | 0 | 0.4953 | 0.5036 |
| | *c= 5.2093±0.0003* | O | 2b | 0.3333 | 0.6667 | 0.4458 | |
| ZnO:Ni7.5% | *a= 3.2518±0.0001* | Zn/Ni | 2a | 0 | 0 | 0.1570 | 0.4851 |
| | *c= 5.2101±0.0004* | O | 2b | 0.3333 | 0.6667 | 0.5779 | |
| ZnO:Ni10% | *a= 3.2526±0.0003* | Zn/Ni | 2a | 0 | 0 | 0.1515 | 0.4642 |
| | *c= 5.2106±0.0002* | O | 2b | 0.3333 | 0.6667 | 0.5745 | |
| ZnO:Ni12.5% | *a=3.2524±0.0002* | Zn/Ni | 2a | 0.3333 | 0.6667 | 0 | 0.4035 |
| | *c= 5.2093±0.0003* | O | 2b | 0.3333 | 0.6667 | 0.5968 | |

Table S2. EDAX analysis of Ni-doped ZnO samples.

| Element | ZnO:Ni0% | ZnO:Ni5% | ZnO:Ni7.5% | ZnO:Ni10% | ZnO:Ni12.5% |
|---|---|---|---|---|---|
| Ni | 0 | 4.85(±0.05) | 7.25(±0.03) | 9.63(±0.01) | 12.24(±0.04) |
| ZnO | 100 | 95.15(±0.05) | 92.75(±0.03) | 90.37(±0.01) | 87.76(±0.04) |

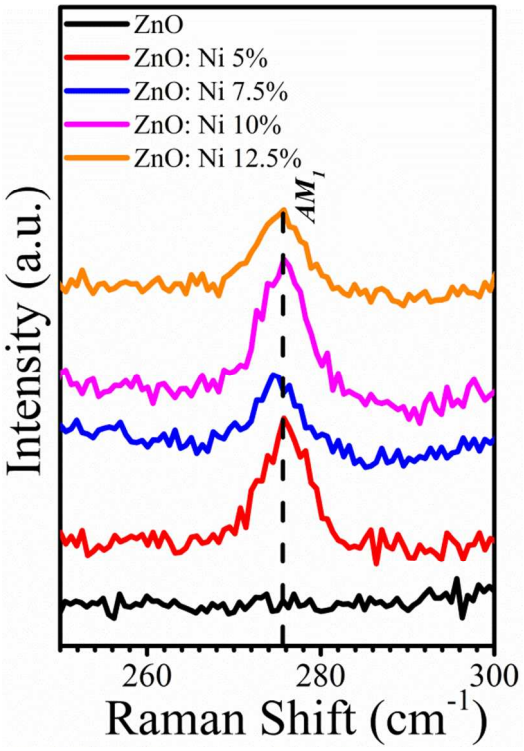


*Figure S1. (Colour online) Shows the Raman peak of the additional mode.*

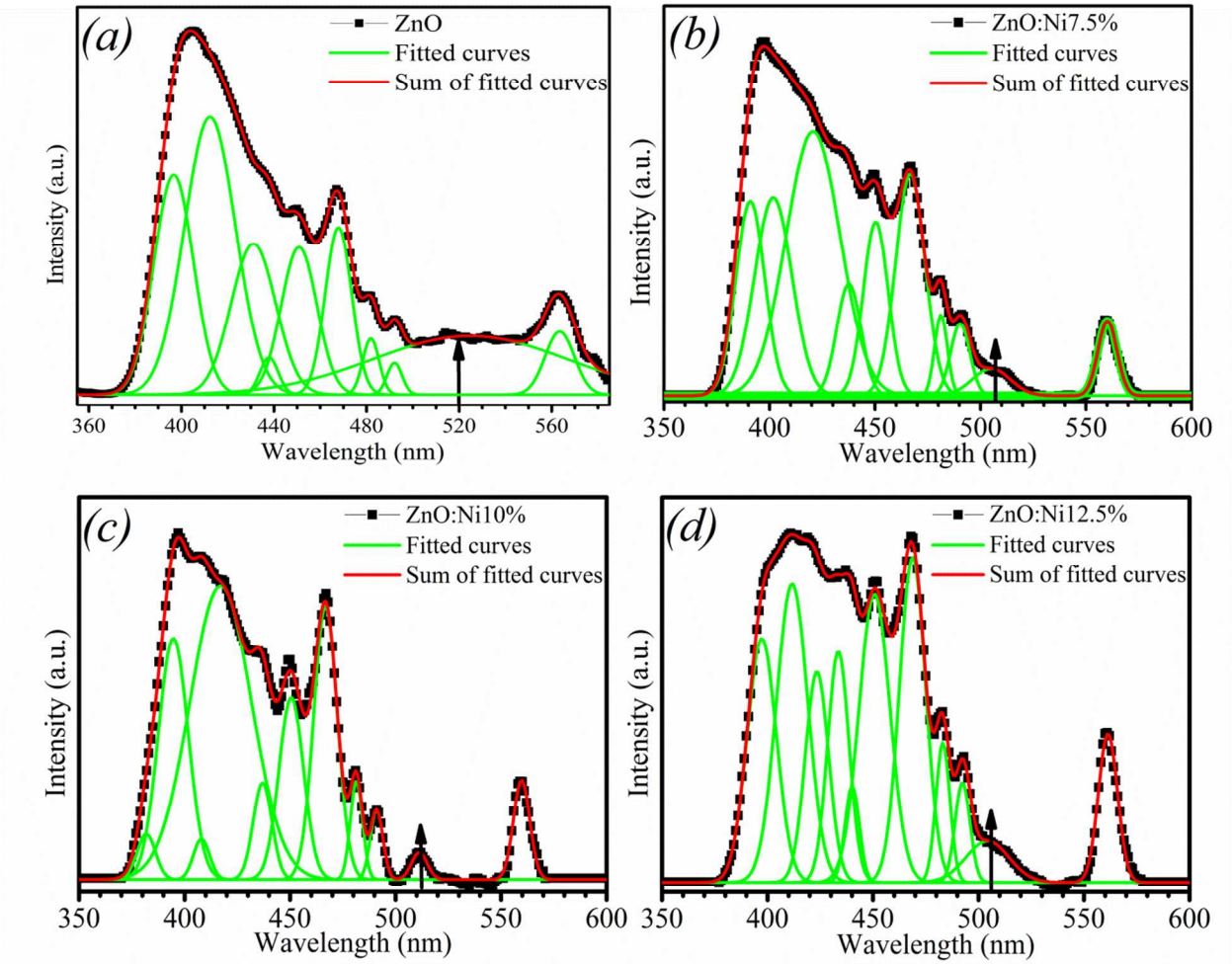


*Figure S2. (Colour online) Shows Room temperature PL spectra of (a) ZnO (b) Ni 7.5% doped ZnO (c) Ni 10% doped ZnO (d) Ni 12.5% doped ZnO. The black dots shows experimental data, solid green and red lines are Gaussian fitting of individual peaks and sum of all peaks, respectively (↑ arrow indicate the presence of $E_{10}$ peak in ZnO samples).*

*Table S3. Peak position and relative peak intensity of deconvoluted PL spectra of Ni doped ZnO sample. Peak position (nm) and relative intensity (%) have the errors ±1.*

| Peak No. | ZnO | | ZnO: Ni 5% | | ZnO: Ni 7.5% | | ZnO: Ni 10% | | ZnO: Ni 12.5% | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Peak Position (nm) | Rel. int. (%) | Peak Position (nm) | Rel. int. (%) | Peak Position (nm) | Rel. int. (%) | Peak Position (nm) | Rel. int. (%) | Peak Position (nm) | Rel. int. (%) |
| 1 | 396 | 61 | 399 | 100 | 390 | 39 | 381 | 4 | 397 | 76 |
| 2 | 412 | 100 | 408 | 2 | 401 | 51 | 394 | 40 | 411 | 100 |
| 3 | 431 | 47 | 419 | 67 | 420 | 100 | 408 | 3 | 423 | 52 |
| 4 | 437 | 5 | 436 | 57 | 437 | 18 | 417 | 100 | 433 | 53 |
| 5 | 450 | 37 | 450 | 29 | 450 | 30 | 436 | 10 | 440 | 15 |
| 6 | 467 | 31 | 466 | 73 | 466 | 45 | 450 | 25 | 450 | 95 |
| 7 | 481 | 6 | 481 | 11 | 481 | 7 | 466 | 35 | 468 | 90 |
| 8 | 492 | 3 | 490 | 1 | 490 | 9 | 481 | 6 | 483 | 21 |
| 9 | 524 | 79 | 498 | 12 | 505 | 7 | 490 | 5 | 492 | 16 |
| 10 | 563 | 13 | 514 | 12 | 543 | 0.6 | 511 | 2 | 504 | 19 |
| 11 | - | - | 561 | 14 | 560 | 9 | 559 | 9 | 561 | 30 |