

CHANDRASEKHAR MURAPAKA

PERSONAL DETAILS

Chandrasekhar Murapaka
Assistant Professor
Department of Materials Science and Metallurgical Engineering
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PROFESSIONAL EXPERIENCE

- **Research Fellow** (Mar 2018– July 2018) Nanyang Technological University, Singapore
- **Research Engineer** (Feb 2016–Feb 2017) Spintec, CEA Grenoble, France
- **Senior Engineer, Technology Development** (May 2015– Feb 2016) Globalfoundries, Singapore
- **Research Associate** (Feb 2014–May 2015) Nanyang Technological University, Singapore
- **Project Associate** (May 2009– Oct 2009) Indian Institute of Technology, Delhi

EDUCATION

- **Ph. D.** Nanyang Technological University, Singapore, 2014
- **M. Tech. (Solid State Materials)** Indian Institute of Technology Delhi, 2009
- **M. Sc. (Physics)** Andhra University Visakhapatnam, 2006
- **B. Sc. (Physics, Mathematics, Computer Science)** Andhra University, Visakhapatnam, 2004

AWARDS/FELLOWSHIPS

- ❖ Received Gold medal for Best Ph.D. thesis in physics from Materials Research Society Singapore
- ❖ Best presenter (Gold) award in the IEEE Magnetics Symposium Singapore chapter 2013
- ❖ IEEE student travel award to participate in InterMag conference 2012 held at Vancouver, Canada
- ❖ IEEE Magnetics Society grant to attend 5th IEEE Magnetics Summer School 2012
- ❖ Secured all India 48th rank in Graduate Aptitude Test in Engineering (GATE 2007)
- ❖ DST- INSPIRE faculty award (2017)
- ❖ Enhanced Eurotalents fellowship to conduct Postdoctoral Research at Spintec 2016 – 2018
- ❖ NTU Research Scholarship for pursuing Ph. D. 2010 – 2014

- ❖ Human Resource Development Scholarship for pursuing M. Tech. at IIT Delhi 2007 – 2009

TEACHING

- ✓ “Physics of Spintronic devices” at NTU Singapore (March- May 2018)
- ✓ “Magnetic Materials” at IIT Hyderabad (Sep-Oct 2018)

RESEARCH INTERESTS

Spintronic based memory and logic devices, Nanomagnetic materials, Domain wall dynamics in ferromagnetic networks, Spin torque nano-oscillators for RF applications, Spin-orbit torque induced magnetization switching and dynamics, Magnetic tunnel junctions, Micro and Nanofabrication techniques.

List of Publications

1. S. Krishnia, Chandrasekhar Murapaka, P. Sethi, G. J. Lim, Q. Y. Wong, W. Gan and W. S. Lew, “Current-induced spin-orbit effective field modulations in synthetic antiferromagnetic structures” *Journal of Magnetism and Magnetic Materials* (Under review 2018).
2. A. Ruiz-Calaforra, A. Purbawati, T. Bracher, J. Hem, Chandrasekhar Murapaka, E. Jimenez-Romero, D. Mauri, A. Zeltser, J. A. Katine, M.-C. Cyrille, L. D. Buda-Prejbeanu, and U. Ebels, "Frequency shift keying in MTJ based Spin torque nano-oscillator with high bit rates" *Applied Physics Letters* 111, 082401 (2017).
3. Chandrasekhar Murapaka, P. Sethi, S. Goolaup and W. S. Lew, "Reconfigurable logic via gate controlled domain wall trajectory in magnetic network structure", *Scientific Reports* 6, 20130 (2016).
4. P. Sethi, Chandrasekhar Murapaka, S. Goolaup, Y. J. Chen, S. H. Leong and W. S. Lew, "Direct observation of deterministic domain wall trajectory in magnetic network structures", *Scientific Reports* 6, 19027 (2016).
5. DW Wong, I Purnama, GJ Lim, WL Gan, Chandrasekhar Murapaka and W. S. Lew, "Current- induced three-dimensional domain wall propagation in cylindrical NiFe nanowires", *Journal of Applied Physics* 119 (15), 153902 (2016).
6. P. Sethi, Chandrasekhar Murapaka, G. J. Lim, and W. S. Lew, "In-plane current induced domain wall nucleation and its stochasticity in perpendicular magnetic anisotropy Hall cross structures", *Applied Physics Letters* 107, 192401 (2015).
7. Chandrasekhar Murapaka, S. Goolaup, I. Purnama and W. S. Lew, “Coupled domain wall oscillations in magnetic cylindrical nanowires”, *Journal of Applied Physics* 117, 053913 (2015).

8. Chandrasekhar Murapaka, M. Tran, L. Wang, G. C. Han and W. S. Lew, "Increased stability against spin torque noise in current perpendicular to the plane self-biased differential dual spin valves", *Journal of Magnetism and Magnetic Materials* 374, 740 (2015).
9. D. W. Wong, Chandrasekhar Murapaka, W. L. Gan, I. Purnama and W. S. Lew, "Dynamics of three-dimensional helical domain wall in cylindrical NiFe nanowires", *Journal of Applied Physics* 117, 17A747 (2015).
10. S. Goolaup, M. Ramu, Chandrasekhar Murapaka and W. S. Lew, "Transverse domain wall profile for logic applications", *Scientific Reports* 5, 9603 (2015).
11. Chandrasekhar Murapaka, P. Sethi, S. Goolaup, M. Ramu, Y. J. Chen, S. H. Leong, and W. S. Lew, "Direct observation of domain wall evolution at a bifurcation in magnetic network structures", *Applied Physics Express* 7, 113003 (2014).
12. Chandrasekhar Murapaka, S. Goolaup, I. Purnama and W. S. Lew, "Depinning assisted by domain wall deformation in cylindrical nanowires", *Journal of Applied Physics* 115, 083913 (2014).
13. C. Guite, I. S. Kerk, Chandrasekhar Murapaka, R. Maddu, S. Goolaup, and W.S. Lew, "All- electrical single domain wall generation for on-chip applications", *Scientific Reports*, 7, 7459 (2014).
14. W.L. Gan, Chandrasekhar Murapaka, D.W. Wong, I. Purnama, S.Y. Chiam, N. Wong and W.S. Lew, "Multi-vortex states in magnetic nanoparticles", *Applied Physics Letters* 105, 152405 (2014).
15. I. Purnama, Chandrasekhar Murapaka, W. S. Lew and T. Ono, "Remote driving of multiple magnetic domain walls due to topological interaction", *Applied Physics Letters* 104, 092414 (2014).
16. R. Maddu, I. Purnama, S. Goolaup, Chandrasekhar Murapaka, and W.S. Lew, "Investigation of dominant spin wave modes by domain walls collision", *Journal of Applied Physics* 115, 243908 (2014).
17. Y. P. Liu, S. Goolaup, W. S. Lew, I. Purnama, Chandrasekhar Murapaka, S. Goolaup, T. Zhou and S. K. Wong, "Excitonic bandgap dependence on stacking configuration in four layer graphene", *Applied Physics Letters* 103, 163108 (2013).
18. G. C. Han, Q. Jinjun, Q. J. Yap, L. Ping, Chandrasekhar Murapaka, Z. Baoyu, K. C. Weng, "Gap layer effect on performances of differential dual spin valve" , *IEEE Transactions on Magnetics*. 49, 3714 (2013).
19. Chandrasekhar Murapaka, H. F. Liew, I. Purnama, W. S. Lew, M. Tran and G. C. Han, "Helical domain walls in constricted cylindrical NiFe nanowires", *Applied Physics Letters* 101, 152406 (2012).
20. Chandrasekhar Murapaka, C. C. Wang, G. C. Han and W. S. Lew, "Effect of interlayer coupling on the reversal process of differential dual spin valves", *Journal of Applied Physics* 111, 07B723 (2012).

21. X. H. Wang, Chandrasekhar Murapaka, I. Purnama, W. S. Lew, S. Goolaup and C. X. Cong, "Magnetization reversal in nano triangles fabricated by nanosphere lithography", *Thin Solid Films* 520, 6980 (2012).
22. X. H. Wang, I. Purnama, Chandrasekhar Murapaka and W. S. Lew, "Highly Stable Vortex State in Sub-100nm Nanomagnets", *Applied Physics Express* 5, 053001(2012).
23. Chandrasekhar Murapaka, S. Goolaup, I. Purnama and W. S. Lew, "Crossover in the domain wall potential polarity as function of anti-notch geometry," *Journal of Physics D: Applied Physics* 44, 235002 (2011).
24. I. Purnama, Chandrasekhar Murapaka, S. Goolaup and W. S. Lew, "Collective motions assisted by magnetostatic interactions in coupled domain wall system," *IEEE Transactions on Magnetics*. 47, 3081 (2011).
25. I. Purnama, Chandrasekhar Murapaka, S. Goolaup and W. S. Lew, "Current induced coupled domain walls motion in two-nanowire system," *Applied Physics Letters* 99, 152501 (2011). (Appeared in *Virtual Journal of Nanoscience and Nanotechnology*).
26. A. Amarnath Reddy, Chandrasekhar Murapaka, K. Pradeesh, S. Suresh Babu and G. Vijaya Prakash, "Optical properties of Dy³⁺ -doped sodium-aluminium-phosphate glasses," *Journal of Material Science* 46, 2018 (2011).
27. S. Goolaup, S. C. Low, Chandrasekhar Murapaka and W. S. Lew, "Dependence of pinning on domain wall spin structure and notch geometry," *Journal of Physics: Conference Series* 266, 012079 (2011).
28. Y. P. Liu, S. Goolaup, Chandrasekhar Murapaka, W. S. Lew and S. K. Wong, "Effect of magnetic field on the electronic transport in trilayer graphene," *ACS Nano*, 4, 7087 (2010).

List of Patents

1. “Non-Volatile Logic Device”, W.S. Lew, Chandrasekhar Murapaka, I. Purnama, S. Goolaup, P. Sethi and C. Guite, US Patent US9431599 B2 (Granted).
2. “Memory device including a domain wall and ferromagnetic driver nanowire”, W. S. Lew, I. Purnama and Chandrasekhar Murapaka, US patent US9502090 B2 (Granted).
3. “Method of forming a magnetic domain wall in a nanowire”, C. Guite, I. S. Kerk, Chandrasekhar Murapaka and W. S. Lew, US patent US20160064060 A1 (Filed).
4. “Magnetic Random Number Generator”, P. Sethi, Chandrasekhar Murapaka and W. S. Lew, US patent US20170212728 A1 (Filed).
5. “Programmable logic operation via domain wall profile manipulation”, S. Goolaup, H. K. Teoh, Chandrasekhar Murapaka, M. Ramu, I. Purnama and W.S. Lew US Provisional Patent 61/748, 337 (2015).
6. “Coupled domain wall oscillator as microwave generator”, W.S. Lew, Chandrasekhar Murapaka, and I. Purnama, US Provisional Patent 61/845,097 (2013).

Book chapter Contribution

1. “**Magnetic domain walls for memory and logic applications**”,
Chandrasekhar Murapaka, Indra Purnama and Wen Siang Lew
“**Advances in Magnetic Materials: Processing, Properties and Performance**”,
Edited by Prof. Sam Zhang & Prof. Dongliang Zhao, CRC Press (2017).
2. “**Spintronic based memory and logic devices**”
Jyotirmoy Chatterjee, Pankaj Sethi and Chandrasekhar Murapaka
“**Nanoscale Devices: Physics, Modeling, and Their Application**” Edited
by Prof. Brajesh Kumar Kaushik, CRC Press (2018).

Research work presented in National/International conferences

1. "Realization of MTJ based uniform spin torque oscillators for FSK and PLL system operations" Chandrasekhar Murapaka, A. Ruiz-Calaforra, A. Purbawati, B. Rimmler, E. Jimenez, K. Merazzo-Jaimes, A. Ruiz-Calaforra, M.-C. Cyrille, L. Vila, R. Ferreira and U. Ebels, 62nd Annual conference on Magnetism and Magnetic Materials (MMM) 2017, Pittsburgh, USA.
2. "Frequency shift keying with spin torque nano-oscillators", Chandrasekhar Murapaka, A. Ruiz-Calaforra, A. Purbawati, T. Bracher, E. Jimenez, K. Merazzo-Jaimes, M.-C. Cyrille, L. Vila, R. Ferreira and U. Ebels, Magnonics 2017, Oxford UK.
3. "Enhanced power of spin torque oscillators with Permalloy free layer", Chandrasekhar Murapaka, E. Jimenez, K. Merazzo-Jaimes, A. Ruiz-Calaforra, M.-C. Cyrille, L. Vila, R. Ferreira and U. Ebels, IEEE International Magnetism conference (Intermag) 2017 Dublin, Ireland.
4. "Magnetic nanoparticle synthesis by chemical slicing", Chandrasekhar Murapaka, W. L. Gan, I. Purnama and W. S. Lew IEEE Magnetism Society symposium Singapore chapter 2013.
5. "Low current domain-wall oscillators", Chandrasekhar Murapaka I. Purnama and W. S. Lew, International Symposium on Advanced Magnetic Materials and Applications (ISAMMA) 2013 Taichung, Taiwan.
6. "Anomalous domain wall depinning behavior in cylindrical nanowires", Chandrasekhar Murapaka, I. Purnama and W. S. Lew, Joint European Magnetic Symposia (JEMS) 2013 Rhodes, Greece.
7. "Striped Cylindrical Nanowire as a Magnetic Domain Wall Nanobarcode", Chandrasekhar Murapaka, H. F. Liew, I. Purnama and W. S. Lew, IEEE International Magnetism conference (Intermag) 2012, Vancouver, Canada.
8. "Spin Transfer induced Noise in Permalloy- Based Differential Dual Spin Valves" Chandrasekhar Murapaka, M. Tran, C. C. Wang, G. C. Han and W. S. Lew, International conference of young researchers (ICYRAM) 2012, Singapore.
9. "Controlled formation of helical domain walls in constricted cylindrical NiFe nanowires" Chandrasekhar Murapaka, I. Purnama and W. S. Lew, IEEE Magnetism Summer School 2012, SRM University Chennai, India.
10. "Crossover in Domain Wall Potential Polarity as a Function of Anti-notch Geometry", Chandrasekhar Murapaka, S. Goolaup, I. Purnama and W. S. Lew, International conference on Materials for Advanced Technologies (ICMAT) 2011, Singapore.
11. "Effect of interlayer coupling on the reversal process of differential dual spin valves", Chandrasekhar Murapaka, C. C. Wang, G. C. Han and W. S. Lew, 56th Annual conference on Magnetism and Magnetic Materials (MMM) 2011, Scottsdale, Arizona, USA.

12. "Electrical characterization of GaN based MIS diodes with high-k dielectrics" G. Singha, G. Agarwal, Chandrasekhar Murapaka and R. Singh, Solid State Physics Symposium (DAE-SSPS) 2008 BARC Mumbai, India.