

Venkata Amarnadh Surapaneni

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EDUCATION

Ph.D. in Natural Sciences, grade: 1.0/1.0[§], *magna cum laude* Jun 2017–Feb 2021

University of Freiburg, Freiburg im Breisgau, Germany

Ontogeny and morphology of plant cuticular ridges, and their effect on insect attachment: experiments, theory and biomimetics

M.Tech in Nanotechnology, grade: 8.36/10[§] Jul 2012–2014

National Institute of Technology Karnataka, Surathkal, India

B.Tech in Mechanical Engineering, grade: 79.45/100[§] Sep 2005–Apr 2009

Acharya Nagarjuna University, Guntur, India

RESEARCH EXPERIENCE

Visiting Academic Apr–Jun 2024

Trinity College Dublin, Dublin, Ireland

- Conducted field and lab research on fish filter-feeding systems with applications to fluid flow
- Used particle image velocimetry to understand flow around real and 3D-printed prototypes of basking shark rakers.

Postdoc Feb 2022–Apr 2024

City University of Hong Kong, Kowloon, Hong Kong

- Studied materials and mechanics of shark filters and bird heads as models for bioinspiration
- Utilized high-resolution microscopy and mechanical testing to comprehend the fracture toughness of filter structures in large filter-feeding sharks
- Currently conducting microscale morphological characterization and dynamic testing to explore the impact behavior of bird casques

Postdoc Jul–Sep 2021

Max Planck Institute of Colloids and Interfaces, Potsdam, Germany

- Investigated nanostructural architecture and mechanics of bright blue skin in stingrays
- Discovered a new colloidal system of nanocrystals responsible for the structural blue color
- Conducted 2D FFT to explore the architectural and physical basis of blue color

Research Fellow Sep 2010–Oct 2011

Indian Institute of Technology Bombay, Mumbai, India

- Played a key role in setting up the Mechanics of Materials lab
- Assembled and tested microscale tensile testing equipment for small-scale fracture and fatigue testing of nanocrystalline MEMS samples
- Conducted assembly and testing of Split-Hopkinson bar setup for dynamic compression experiments on nanocrystalline materials

TEACHING EXPERIENCE

Assistant Professor, Department of Mechanical Engineering Dec 2015–May 2017
VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad, India

Assistant Professor, Department of Mechanical Engineering Dec 2014–Dec 2015
Mahatma Gandhi Institute of Technology, Hyderabad, India

Lecturer, Department of Mechanical Engineering Sep 2009–Mar 2010
Bapatla Engineering College, Bapatla, India

Subjects taught: Engineering Drawing, Engineering Mechanics, Mechanics of Materials

OTHER PROJECTS AND TRAINING

EGO Elektro Gerätebau GmbH, Oberderdingen, Germany Apr 2019
Evaluation of the potential for a functional principle of adhesion/anti-adhesion in
plant-insect interactions into technical household products
Advisor: Mr. Uwe Schaumann

University of Cambridge, Cambridge, United Kingdom Apr 2018, Feb 2019
Training in the use of genetic techniques to manipulate surface morphology in plant leaves
Advisor: Prof. Beverley Glover

Adolphe Merkle Institute, Fribourg, Switzerland Sep 2018
Training and experiments on atomic force microscopy of plant leaf microstructures
Advisor: Prof. Nico Bruns

Indian Institute of Technology Madras, Chennai, India May-Jul 2013
Synthesis and characterization of TiO₂ nanotubes and TiO₂-graphene composites
Advisor: Prof. Somnath Chanda Roy

MSME-Tool room, Central Institute of Tool Design, Hyderabad, India May-Aug 2009
Training on "Mechanical CADD" tools

PUBLICATIONS

§ shared first author, * corresponding author

Li T, Schindler M, Paskin M, **Surapaneni VA**, Scott E, Hauert S, Payne N, Cade DE, Goldbogen JA, Mollen FH, Baum D, Hanna S, Dean MN (2025) Functional models from limited data: A parametric and multimodal approach to anatomy and 3D kinematics of feeding in basking sharks (*Cetorhinus maximus*). *The Anatomical Record*, 1–24. doi: 10.1002/ar.25693

Surapaneni VA, Flaum B, Schindler M, Hayat K, Wölfer J, Baum D, Hu R, Kong TF, Doube M, Dean MN (2025) The helmeted hornbill casque is reinforced by a bundle of exceptionally thick, rod-like trabeculae. *Annals of the New York Academy of Sciences*, 1544, 1, 78–91. doi: 10.1111/nyas.15254

Blumer M[§], **Surapaneni VA**[§], Ciecierska-Holmes J, Redl S, Pechriggl EJ, Mollen F, Dean M (2024) Intermediate filaments spatially organize intracellular nanostructures to produce the bright structural blue of ribbontail stingrays across ontogeny. *Frontiers in Cell and Developmental Biology*, 12:1393237. doi: 10.3389/fcell.2024.1393237

Surapaneni VA*[§], Blumer MJ[§], Tadayon K, McIvor AJ, Redl S, Honis HR, Mollen FH, Amini S, Dean MN* (2024) Ribbontail stingray skin employs a core-shell photonic glass ultrastructure to make blue structural color. *Advanced Optical Materials*, 2301909. doi: 10.1002/adom.202301909

Surapaneni VA*, Schindler M, de Faria L, Ziege R, Bidan C, Mollen F, Amini S, Hanna S, Dean M* (2022) Groovy and gnarly: Surface wrinkles as a multifunctional motif for terrestrial and marine environments. *Integrative and Comparative Biology*, 62:749-761. doi: 10.1093/icb/icac079 (Invited)

Surapaneni VA*, Aust T, Speck T, Thielen M (2021) Polarity in cuticular ridge development and insect attachment on leaf surfaces of *Schismatoglottis calyptrata*. *Beilstein Journal of Nanotechnology*, 12, 1326–1338. doi: 10.3762/bjnano.12.98

Surapaneni VA*, Bold G, Speck T, Thielen M (2020) Spatiotemporal development of cuticular ridges on leaf surfaces of *Hevea brasiliensis* alters insect attachment. *Royal Society Open Science*, 7:201319. doi: 10.1098/rsos.201319

Bergmann JB, Maotsou D*, **Surapaneni VA**, Thielen M, Speck T, Wilts BD*, Steiner U* (2020) Polymerization-induced wrinkled surfaces with controlled topography as slippery surfaces for Colorado potato beetles. *Advanced Materials Interfaces*, 7:2000129. doi: 10.1002/admi.202000129

Kumar C[§], Palacios A[§], **Surapaneni VA**, Bold G, Thielen M, Licht E, Higham TE, Speck T*, Le Houérou V (2018) Replicating the complexity of natural surfaces: technique validation and applications for biomimetics, ecology and evolution. *Philosophical Transactions of the Royal Society A*, 377:20180265. doi: 10.1098/rsta.2018.0265

PUBLISHED PATENTS

Kaviti AK, Akkala SR, Pasula N, **Surapaneni VA** (2022) Submerged nanoporous micro hotspot structure for solar desalination and method of preparation. Patent Office Chennai, India, appl. no.: 202241003900

Surapaneni VA (2019) A method to create robust superhydrophobic/self-cleaning surface. Patent Office Chennai, India, appl. no.: 201841003238

TALKS * presenting author

Surapaneni VA*, MN Dean* (2023) Multidisciplinary filter science: Current trends and future directions. *Filters in Biology & Biomimetics (FiBB)*, Berlin, Germany. May 15–16

Surapaneni VA*, Wölfer J, Schindler M, de Faria L, Mollen F, Amini S, Hanna S, Dean M (2022) Ecomorphology of multifunctional wrinkles across terrestrial and aquatic organisms - a source of inspiration for functionalized biomimetic surfaces. *SEB Conference*, Montpellier, France. Jul 5–8

Surapaneni VA*, Schindler M, de Faria L, Ziege R, Bidan C, Mollen F, Amini S, Hanna S, Dean MN (2022) Groovy and gnarly: Surface wrinkles as a multifunctional motif for terrestrial and marine environments. *SICB Annual Meeting*, Phoenix, USA. Jan 3–7 (Invited)

Surapaneni VA* (2022) Bioinspiration - interdisciplinary approach for nature-inspired innovation. VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad, India. Dec 1 (**Invited**)

Surapaneni VA*, Bold G, Thielen M, Speck T (2021) Cuticular folds on plant leaves and their influence on insect adhesion. Max Planck Institute of Colloids and Interfaces, Potsdam, Germany. Jun 21 (**Invited**)

Surapaneni VA* (2019) Comparative biomechanics and bioinspiration. Bapatla Engineering College, Bapatla, India. Dec 27. (**Invited**)

Surapaneni VA*, Bold G, Thielen M, Speck T (2019) Plant cuticular folds and their influence on insect adhesion *FMF Colloquium*, Schluchsee, Germany. Oct 11.

Surapaneni VA*, Bold G, Thielen M, Speck T (2019) Microstructural morphology of plant surfaces and bioinspiration. *PlaMatSu Annual Meeting*, University of Cambridge, Cambridge, UK, Sep 9–19

Surapaneni VA*, Bold G, Thielen M, Speck T (2019) Plant surface microstructures - insect adhesion and biomimetics, *EUROMAT*, Stockholm, Sweden. Sep 1–5

Surapaneni VA*, Bold G, Thielen M, Speck T (2018) Ontogenetic variations of plant surface microstructures and insect adhesion. *International Plant Biomechanics Conference*, Montreal, Canada. Aug 9–14

Surapaneni VA* (2018) Wrinkles: overview, applications and models. *Annual Seminar*, Albert Ludwig's University of Freiburg, Freiburg im Breisgau, Germany. Jun 29.

Surapaneni VA*, Thielen M, Bold G, Speck T (2017) Physics and mechanics of plant surfaces with cuticular folds, *PlaMatSu Meeting*, Adolphe Merkle Institute, Fribourg, Switzerland, Sep 27-29.

Surapaneni VA*, Kaviti AK (2017) On the evaporation of hydrophobic camphor soot mixed water. *International Conf. on Materials Processing & Characterization*, Gokaraju Rangaraju Institute of Engineering and Technology, Hyderabad, India. Mar 17-19.

AWARDS AND RECOGNITIONS

Visiting scientist and Lindau Alumni — '72nd Lindau Nobel Laureate Meeting' Invited by the Council for the Lindau Nobel Laureate Meetings, Germany	2023
Honor magna cum laude — for excellence in doctoral studies University of Freiburg, Freiburg im Breisgau, Germany	2021
First prize — 'Momento Critico', a national-level competition on truss mechanics Jawaharlal Nehru Technological University, Hyderabad, India	2007
Certificate of merit — 'Nocturnal Machines', a national-level competition on linkages Jawaharlal Nehru Technological University, Hyderabad, India	2007
Third rank — II year B.Tech Mechanical Engineering Bapatla Engineering College, Bapatla, India	2007

First prize — Technical quiz, a college-level competition on engineering basics Bapatla Engineering College, Bapatla, India	2006
Second rank — 1 year B.Tech Mechanical Engineering Bapatla Engineering College, Bapatla, India	2006
Scholastic and co-curricular achievements during schooling Flora Public School, Vuyyuru, India	1997, 1998

GRANTS AND FUNDING

FSBI small research grant for a collaborative project at Trinity College Dublin, Ireland ~631220 INR from Fisheries Society of the British Isles, UK	2023
Financial support to attend the '72nd Lindau Nobel Laureate Meeting', Germany ~446600 INR from Council for the Lindau Nobel Laureate Meetings, Germany and Croucher Foundation, Hong Kong	2023
Funding for organizing 'Filters in Biology+Biomimetics' conference, Germany ~1962180 INR from Matters of Activity, Germany; Carl Gans Fund, USA; Fisheries Society of the British Isles, UK; Society for the Study of Evolution, USA; Company of Biologists, UK and Society for Integrative and Comparative Biology, USA	2023
Broadening participation professional development award ~41360 INR from SICB 2023 Annual Meeting, Austin, USA	2023
Travel & registration grant: mechanical ecology-taking biomechanics to the field ~134000 INR from SEB Annual Conference, Montpellier, France	2022

FELLOWSHIPS

Marie Sklodowska Curie Early-Stage Researcher Fellowship ~13417000 INR from EU Horizon 2020 for PhD at University of Freiburg, Freiburg, Germany (also conferred the title 'Marie-Curie Alumni')	2017–2020
MHRD India Fellowship for master studies ~192000 INR for masters at National Institute of Technology Karnataka, Surathkal, India	2012–2014

PROFESSIONAL ACTIVITIES AND OUTREACH

Educational Council member The Society for Integrative and Comparative Biology (SICB), USA	2023–2026
Organizer, first international 'Filters in Biology+Biomimetics' conference Matters of Activity – Image Space Material, Berlin, Germany. May 15–16	2023
Gans award committee (GAC) member, Division of Comparative Biomechanics The Society for Integrative and Comparative Biology (SICB), USA	2023
Editorial reviewer Integrative and Comparative Biology journal	2022–2023

Reviewer for the journals: Acta Biomaterialia, Royal Society Open Science, Bioinspiration and Biomimetics, Biomedical Materials, Beilstein Journal of Nanotechnology, Applied Physics A and Surface Topography: Metrology and Properties	2020–2023
Coordinating member, 'Our Future Is Nature Inspired', a public outreach exhibition Cambridge University Botanic Garden, Cambridge, UK. Sep–Nov	2020
Scientific outreach through Wikimedia projects: popularization of bio-inspired materials on Wikipedia. Adolphe Merkle Institute. Fribourg, Switzerland. Sep 25–26	2018
Coordinator, workshop on 'Advanced Engineering Materials and Applications' VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad, India. Jan 31	2017
Coordinator, 'Open House 2k17', a student project exhibition VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad, India	2017
Organizer, 'MechElements – BECTAGON' 07', a national-level technical symposium Bapatla Engineering College, Bapatla, India	2007

SELECTED MEDIA COVERAGE

"Unraveling Nature's Electric Blues" Forbes. Jul 13	2024
"The colorful secret behind stingrays' electric blue spots" Advanced Science News. Mar 04	2024
"Blue is hard" Daily Tech News Show. Feb 27	2024
"Microscopic wrinkles in leaves ward off insects " Scientific American. Feb 01	2021
"Rubber tree plant leaves found to grow slippery to ward off insects as plant ages" Phys.org. Jan 14	2021
"Vibhinam...Vinuthnam", a highlight on student demonstration of superhydrophobicity Sakshi Newspaper, India. Mar 04	2016

EXTRA-CURRICULAR ACTIVITIES

Founder, Centre for Creative Arts, a student cultural activity club Bapatla Engineering College, India	2008
Organizer, Yuvam' 08, a state-level youth festival Bapatla Engineering College, India. Feb 15-17.	2008
Won one international award and many national and state level awards in sketching and painting, including five awards in popular national-level college fests such as Saarang'08, Saarang'09 at IIT Madras, India and Mood Indigo'08 at IIT Bombay, India	1997-2009