

Curriculum vitae, Chiara Daraio

Sotto settori ERC primari (max 3): PE11 Materials Engineering, PE3_2 Mechanical and acoustical properties of condensed matter, lattice dynamics, PE11_13 Metamaterials engineering

PERSONAL DETAILS

Family name, First name: Daraio, Chiara

Birthdate: 03/03/1978

Researcher unique identifier(s): <https://orcid.org/0000-0001-5296-4440>

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Education and key qualifications

Date	Qualification & Institution
June 2006	PhD, Materials Science and Engineering University of California, San Diego, USA <i>Advisors: Prof. Sungho Jin and Prof. Vitali F. Nesterenko</i>
Jan. 2003	M.S., Materials Science and Engineering University of California, San Diego, USA
Dec. 2001	M.S./B.S. (Diploma di Laurea, 5 yrs), Mechanical Engineering (cum laude) University of Ancona, Politecnico delle Marche, Italy <i>Advisors: Prof. M. Kassner and Prof. E. Evangelista</i>

Current position(s)

Duration	Position & Institution
April 2022 – Present	Director META Reality Labs Research, Pasadena, CA, USA
Feb. 2021 – Present	G. Bradford Jones Professor, Mechanical Engineering and Applied Physics California Institute of Technology, Pasadena, CA, USA

Previous position(s)

Duration	Position & Institution
Sept. 2016 – Jan. 2021	Professor, Mechanical Engineering and Applied Physics California Institute of Technology, Pasadena, CA, USA
Jan. 2013 – Aug. 2016	Professor, Chair in Mechanics and Materials ETH Zürich, Switzerland
Jan. 2011 – Aug. 2016	Professor, Aeronautics and Applied Physics California Institute of Technology, Pasadena, CA, USA
Sept. 2006 – Dec. 2010	Assistant Professor, Aeronautics and Applied Physics California Institute of Technology, Pasadena, CA, USA

RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

Research achievements

Bibliometric Indicators: H-index: [84] | Total Citations: [24824]

The following 20 selected outputs demonstrate significant advancements in mechanical metamaterials, acoustic systems, and soft robotics. They are divided into industrial/entrepreneurial outputs and academic research, reflecting a strong translational profile.

A. Industrial & Entrepreneurial Outputs

1. **Research Director, META Reality Labs (2022–Present):** Directing research initiatives in materials innovation for AR devices, AI-driven materials discovery, robotic sensing and actuation. Role: Director of Research Science.
2. **Co-founder, Tunable Biosystems, Inc. (2025):** Translated foundational research into commercial biotech applications, successfully coordinating seed funding to scale advanced structural bio-systems. Role: Co-founder and scientific lead.
3. **Patent: "Remote haptic feedback utilizing standing waves", META (Filed 2023):** Translates fundamental acoustic and wave mechanic principles into consumer haptic feedback products. Role: Co-inventor.
4. **Patent: "Composite for sensing heat or infrared light and device including same", Samsung Electronics (US-2021024657-A1, Filed 2019):** Developed functional composites directly integrated into global consumer electronic platforms. Role: Principal Investigator on industrial collaboration.
5. **Patent: "Haptic devices using structured metasurfaces", Facebook, Inc. (US-10497227-B2, Filed 2018):** Commercialized structural metasurfaces for tactile interfaces in virtual reality. Role: Co-inventor.

B. Academic Research & Patents

6. **Publication: "3D polycatenated architected materials", Science, (2025):** Demonstrated novel mechanical metamaterials that bridge the gap between solids and fluids. Role: Corresponding Author.
7. **Publication: "Flexible biomimetic block copolymer composite for temperature and long-wave infrared sensing", Science Advances (2023):** Pioneered new flexible sensors mimicking biological systems. Role: Corresponding Author.
8. **Publication: "Growth rules for irregular architected materials with programmable properties", Science (2022):** Established a novel framework using graph theory to design non-periodic metamaterials with tailored mechanical properties. Role:

Corresponding Author.

9. **Publication: "Biological matrix composites from cultured plant cells", PNAS (2022):** Showcased the use of sustainable, agriculturally derived materials for engineered structural composites. Role: Corresponding Author.
10. **Publication: "Structured fabrics with tunable mechanical properties", Nature (2021):** Demonstrated scalable, 3D-printed interlocking particle fabrics capable of transitioning from soft to rigid states. Role: Corresponding Author.
11. **Publication: "Robotic Surfaces with Reversible, Spatiotemporal Control for Shape Morphing...", Science Robotics (2021):** Pioneered surfaces capable of complex shape-morphing and object manipulation. Role: Corresponding Author.
12. **Publication: "Untethered soft robotic matter with passive control of shape morphing and propulsion", Science Robotics (2019):** Advanced the field of autonomous soft robotics using passive control mechanisms. Role: Co-Author/PI.
13. **Publication: "Experimental realization of on-chip topological nano-electro-mechanical metamaterials", Nature (2018):** Provided a groundbreaking experimental demonstration of topological insulators at the nanoscale. Role: Corresponding Author.
14. **Publication: "Designing Perturbative Metamaterials from Discrete Models...", Nature Materials (2018):** Bridged discrete modeling and continuous perturbative metamaterial design. Role: Corresponding Author.
15. **Patent: "Geometric design for anti-infection catheters", Caltech (Filed 2023):** Applied geometric design principles to mechanical structures to inherently control and prevent bacteria distributions. Role: Co-inventor.
16. **Patent: "Ultrasound Responsive Shape Memory Polymer Composites", Caltech (Filed 2023):** Developed remotely actuated medical polymers for minimally invasive surgical applications. Role: Principal Investigator.
17. **Patent: "Method and system for managing epidemics through bayesian learning on contact networks", Caltech (Filed 2021):** Applied complex systems modeling to manage interventions during large-scale epidemics. Role: Co-inventor.
18. **Patent: "Bacteria microtraps", Caltech (US-2019291052-A1, Filed 2018):** Created specialized structures for the capture and manipulation of biological cells. Role: Co-inventor.
19. **Patent: "Architecture for achieving stable wave propagation through a soft material", Harvard/Caltech (US 62/246,433, Filed 2015):** Designed structured materials that manipulate wave propagation in soft matter. Role: Co-inventor.
20. **Book Chapter: "Nonlinear phononic structures and metamaterials", Acoustic Metamaterials and Phononic Crystals, Springer (2013):** Authored a foundational text chapter on the state-of-the-art in nonlinear acoustic metamaterials. Role: Co-Author.

Peer recognition

- **Presidential Early Career Award for Scientists and Engineers (PECASE) (2012):** Awarded at the White House for outstanding research in structural metamaterials and

phononic crystals.

- **Featured Exhibitions:** Work featured at the Milken Center for Advancing the American Dream in Washington, DC (2023) and the John F. Kennedy Presidential Library and Museum (2011).
- **Keynote & Plenary Lectures:** Delivered major addresses at international conferences including Robosoft 2023 (Singapore), the Earnest C. Watson Centennial Lecture (2023), and the Elsevier Distinguished Lecturer (2019),
- **Major Fellowships:** Recipient of the Sloan Research Fellowship (2011), NSF CAREER Award (2010) and ONR Young Investigator Award (2010).

ADDITIONAL INFORMATION

Other contributions to the research community

Research Management & Institutional Coordination:

- **Meta Reality Labs Caltech Campus Initiative (2026):** Established and structured a new Meta Reality Labs office and laboratory on the Caltech campus, serving as a critical bridge between fundamental academic science and tech industry vision.
- **Director, NSF I-UCRC Center to Stream Healthcare in Place (2021–Present):** Managing a high-impact coalition between multiple universities and industrial partners to develop remote healthcare monitoring technologies.
- **Department of Defense MURI Grant (2022–2027):** Managed a multi-university research initiative funded by the Army Research Office on irregular materials research, encompassing extensive publications and milestone progression.
- **Academic Governance:** Caltech Faculty Board Member (2020–Present), Steering Committee Member (2021–2025), and Academic Council Member for the Schmidt Science Fellows and Rhodes Trust (2021–2026).

Outreach, Education & Third Mission:

- **Curriculum Modernization:** Designed and introduced a pioneering graduate course titled "Agentic AI for Scientific Research" (Fall 2026 term), pushing mechanical engineering education into the era of autonomous modeling systems.
- **Editorial Leadership:** Serve as an Associate Editor for *Matter* (Cell Press) and *Multifunctional Materials* (IOP), and on the Board of Review Editors for *Science* (AAAS).
- **Symposium Organization:** Chair (2024) and Vice Chair (2022) of the Gordon Research Conference on "Multifunctional Materials and Structures."
- **Industrial Mentorship:** Consultant for Toyota Motor Engineering & Manufacturing North America (2020–Present) and frequent advisor for defense and tech sector spin-offs.