

## Jacob Klein

Department of Molecular Chemistry and Materials Science, Weizmann Institute of Science, Rehovot, 76100, Israel

Phone: +972-8-9343823; [jacob.klein@weizmann.ac.il](mailto:jacob.klein@weizmann.ac.il). Website: <https://www.weizmann.ac.il/materials/klein/>

**Personal:** Primary and secondary Education: Israel (1955-58), England (1958-66). Marital Status: Married + 4 children.

### Academic education and career

1970 – 1973: B.A. (1st Class Honours), in Physics, at the Cavendish Laboratory, Cambridge University  
1974 – 1977: Ph.D. degree in the Cavendish Laboratory: "Diffusion of Long Molecules Through Bulk Polymers". (Supervisor: David Tabor).  
1976 – 1984: Research Fellow (1976-7) and Fellow in Physics of St. Catharine's College Cambridge.  
1977: Awarded M.A., Ph.D degrees by Cambridge University.  
1977 – 1980: Post-doctoral Fellow, Department of Polymer Research, Weizmann Institute of Science, Rehovot, Israel  
1980 – 1984: Assistant Professor, Department of Physics, University of Cambridge  
1980 - 1984: Senior Scientist, Weizmann Institute of Science.  
1984 - 1987: Associate Professor, Weizmann Institute of Science.  
1986 - present: Herman Mark Professor of Soft Matter Physics, Weizmann Institute of Science (Full Professor since 7/1987).  
1989 - 1991: Head, Polymer Research Department, Weizmann Institute of Science.  
1999 – 2000: Chairman of Scientific Council, Weizmann Institute  
2000 - 2007: Dr. Lee's Professor of Chemistry, University of Oxford  
2000 – 2005: Head of Department, Physical and Theoretical Chemistry Department, University of Oxford

### Visiting Positions

1990: Visiting Professor, University of California at Santa Barbara  
1991: Visiting Professor, Princeton University  
1994: Royal Society Exchange Professor, Oxford University  
1996: Visiting Professor, Ecole Polytechnique Federal – Lausanne  
2004: Paris Sciences Professor, Ecole Supérieure de Physique et Chimie Industrielle, Paris  
2008: Frank & Robert Laughlin Professor, Cornell University  
2010-19: Visiting Professor, Tsinghua University, Beijing  
2017-20: Visiting Professor and Chief Scientist, Beihang University, Beijing

### Selected honours and named lectures

1983: Somach Sachs Prize, Weizmann Institute of Science.  
1984: Charles Vernon Boys Prize, British Institute of Physics,  
1987: Dudley Wright Award in Membrane Research  
1994: International Kao Fellow, Japan  
1995: High Polymer Physics Prize, American Physical Society  
1998: Ford Annual Science Lecture (Ford Motor Company, Michigan)  
2000: Whitby Lectures (Akron Univ., Ohio)  
2001: Fellow, Royal Society of Chemistry  
2002: Inaugural John D. Ferry Lectures (Univ. of Wisconsin)  
2003: Fellow, American Physical Society  
2004: Paris Science Medal, City of Paris  
2004: Annual Award Lecture of the Japanese Chemical Society  
2004: Fellow, Institute of Physics, UK  
2004: Paris Science Lectures, Ecole Supérieure de Physique et Chimie Industrielle, Paris  
2007: Kolthof Prize, Technion Israel Institute of Science  
2008: The Laughlin Lectures, Cornell University  
2010: ERC Advanced Grant Award (2010-2015)  
2010: Israel Chemical Society Prize for Excellence  
2011: Honorary Membership, Israel Polymers & Plastics Society  
2011: Royal Society of Chemistry (UK) Soft Matter and Biophysics Prize and Medal  
2012: Tribology Gold Medal of the International Tribology Trust (top award in field)

2013: Elected to Academia Europaea  
 2014: Molecular Science Frontiers Professorship, Chinese Academy of Science  
 2015: David Turnbull Award, Materials Research Society  
 2016: Elected to Israel Academy of Sciences and Humanities  
 2017: ERC Advanced Grant Award (2017-2023)  
 2017: Liquid Matter Prize of the European Physical Society (awarded once every 3 years)  
 2019: Gold Medal of the Israel Chemical Society  
 2020: The Rothschild Prize  
 2021: Irving Langmuir Award in Chemical Physics of the American Physical Society  
 2021: Overbeek Gold Medal of the European Colloid and Interface Society  
 2021: Wiley Life Achievements Award  
 2012-2022 6 ERC Proof-of-Concept Awards

Editorial and journal advisory boards (year of appointment)

1988: Editorial Board, 'Macromolecules';  
 1992: Editorial Board, 'Acta Polymerica'  
 1992: Editorial Board, 'Journal of Macromolecular Science' – Polymer Reviews.  
 1995: Editorial Board, Israel Journal of Chemistry; (Guest editor special issue 'Polymers at surfaces')  
 1993: Editorial Board, J. Polymer Science: Physics  
 2000: Editorial Board, Macromolecular Chemistry and Physics, and Macromolecular Rapid Communications  
 2001: Editorial Board Liquids and Soft Matter Board, J. Physics: Condensed Matter;  
 2004: Editorial Board, ChemPhysChem  
 2013: Editorial Board, Friction  
 2022: Editorial Board, Philosophical Transactions of the Royal Society A

Research: 310+ research papers to date (including ca. 25 in *Science* and *Nature*).

Mentoring: ca. 85 graduate and post-doctoral students to date, of whom 36 currently in tenured (or tenure-track) academic appointments

Invited lectures at international meetings: Over 270 invited keynote/plenary lectures at international meetings since 1993.

Industrial consultancies (past and current): 1985-1995 Exxon Corporate Research; Unilever; Procter & Gamble; Kodak; Johnson & Johnson; W.R. Grace; Strauss Inc. (Israel, current); Liposphere Ltd. (Israel, current).

Selected past and present academic positions of trust:

Dutch Academy of Sciences large grants review panel  
 German Science Foundation review panel for several Schwerpunktprograms  
 Senior Jury of Institut Universitaire Francaise  
 Science Foundation Ireland major grants review panel  
 Max Planck Society (Germany) Advisory Committee on establishing new MPIs.  
 Selection panel for Coulson Chair of Theoretical Chemistry, University of Oxford  
 Chair of Weizmann Institute Central Academic Appointments Committee  
 Member of Weizmann Institute Tenure and Professorial Appointments committee  
 Chairman of Scientific Council, Weizmann Institute  
 Member, Weizmann Institute Presidents Council  
 International Advisory Board, State Key Laboratory of Tribology, Tsinghua University, Beijing

Research interests

Understanding the physical properties of soft matter, including liquids (especially water), polymers, lipids, and colloidal dispersions, and their applications, particularly at interfaces. This has been achieved through direct measurement of forces, molecular motion and interfacial dissipation by such materials at surfaces and under confinement, using self-designed apparatus with unique sensitivity and resolution to the sub-nanometre level; the molecular modeling of these effects, and their implementation in

biomedical applications. The concept of hydration lubrication, discovered and developed in the past 3 decades, has been especially fruitful.

#### Technology transfer

Many of the findings of Klein's lab have been patented. 8 of these patents, related to lipids as lubricating elements based on the hydration lubrication mechanism, were licensed to the company Liposphere Ltd. (<https://www.lipo-sphere.com/>), founded in 2019 by two of Klein's former students (Dr. Ronit Goldberg and Dr. Sabrina Jahn). This company develops (non-drug) lipid-based treatments for biolubrication-related pathologies, including in particular alleviation of osteoarthritis-related pain. Recent first-in-human double-blind placebo-controlled clinical trials have been successfully completed. This hydration-lubrication-based technology, and Liposphere in particular, were highlighted by the International Union of Pure and Applied Chemistry (IUPAC) as one of the top emerging technologies in chemistry for 2024 ('IUPAC's 2024 Top Ten Emerging Technologies in Chemistry', F. Gomollón-Bel, *Chemistry International*, **46**(4), 8-16, (especially pp. 10-11), (2024) <https://doi.org/10.1515/ci-2024-0403>)