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Biography

Willem Vos obtained a Ph.D. in physics at the University of Amsterdam with highest honors (cum laude) for his thesis “Phase behavior of simple systems at high pressure” in 1991. He held a prestigious Carnegie Fellowship at the Geophysical Lab of the Carnegie Institution for Science (USA) where he discovered a novel class of so-called van der Waals compounds at very high pressures (1992 Nature paper). He then moved to study photonic crystal and colloid physics. His team pioneered “inverse opal” photonic crystals that have become very popular (1998 Science paper [>2100x cited]). Since 2002 Vos is professor in Complex Photonic Systems (COPS) at the MESA+ Institute of Nanotechnology at the University of Twente. His team demonstrated the first ever control of spontaneous emission of light with 3D photonic crystals and subsequently with 3D photonic band gaps. In 2005 he received a personal VICI grant of the Dutch Science Foundation NWO. Vos is a Fellow of the APS and of the OSA, a recipient of the Snellius medal and of the Descartes-Huygens prize of the French Academy of Sciences. Vos’ papers are cited >45x on average. His students have become faculty members at leading institutions, or pursue careers in major industries and in non-profit organizations.

Abstract - Applied Nanophotonics? Nanophotonics applied!

The field of Nanophotonics has been yielding a staggering variety of novel scientific concepts and novel applications. Traditional optical components such as lenses and microscopes cannot focus light to deep subwavelength nanometer scales due to the Abbe diffraction limit. However, one can squeeze light into a nanometer scale by carefully manipulating the near-field evanescent waves with nanomaterials such as metamaterials, plasmonic systems, and photonic crystals and many others. Nanophotonics is yielding applications in fields ranging from biochemistry to electrical engineering and data communication, thanks to major progress in optoelectronics and microelectronics (where our Tokyo colleagues have done pioneering work in achieving miniature thresholdless lasers in 3D band gap crystals), in solar cells, spectroscopy, and in microscopy.

In the Applied Nanophotonics (ANP) cluster at the University of Twente, a team of 80 researchers studies a variety of topics such as photonic crystals to store light, quantum-protected cyber security, advanced mirrors for the chip industry, quantum light processing in complex media and in programmable on-chip networks, and extremely precise, miniaturized lasers for integrated photonics. The ANP cluster is the largest Dutch concentration of scientists in Nanophotonics. ANP started the new research field “wavefront shaping” to focus light inside or beyond opaque media and managed to look through opaque screens! ANP delivers new insights in the fundamentals of light propagation and explores emerging applications (“Nanophotonics applied!”), in the spirit of the University of Twente entrepreneurial DNA. Together with industry, knowledge is developed notably on free-form light scattering, photovoltaics, photonic integrated circuits for quantum information, and for sensing such as water quality monitoring.
After a brief introduction of ANP, I will report some recent research highlights, including from our ongoing collaboration with the team of prof. Iwamoto and prof. Arakawa.