

EDITORIAL

Colloidal suspensions



Professor Henk Lekkerkerker.

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Special issue in honour of Henk Lekkerkerker's 65th birthday

Professor Henk N W Lekkerkerker is a world-leading authority in the field of experimental and theoretical soft condensed matter. On the occasion of his 65th birthday in the summer of 2011, this special issue celebrates his many contributions to science.

Henk Lekkerkerker obtained his undergraduate degree in chemistry at the University of Utrecht (1968) and moved to Calgary where he received his PhD in 1971. He moved to Brussels as a NATO fellow at the Université Libre de Bruxelles and was appointed to an assistant professorship (1974), an associate professorship (1977) and a full professorship (1980) in physical chemistry at the Vrije Universiteit Brussel. In 1985 he returned to The Netherlands to take up a professorship at the Van 't Hoff Laboratory, where he has been ever since. He has received a series of awards during his career, including the Onsager Medal (1999) of the University of Trondheim, the Bakhuis Roozeboom Gold Medal (2003) of the Royal Dutch Academy of Arts and Sciences (KNAW), the ECIS-Rhodia European Colloid and Interface Prize (2003), and the Liquid Matter Prize of the European Physical Society (2008). He was elected a member of KNAW in 1996, was awarded an Academy Chair position in 2005, and has held several visiting lectureships.

Henk's work focuses on phase transitions in soft condensed matter, and he has made seminal contributions to both the theoretical and experimental aspects of this field. Here we highlight three major themes running through his work, and a few selected publications.

So-called depletion interactions may lead to phase separation in colloid-polymer mixtures, and Henk realised that the partitioning of polymer needs to be taken into account to describe the phase behaviour correctly [1]. Colloidal suspensions can be used as model fluids, with the time- and length-scales involved leading to novel opportunities, notably the direct observation of capillary waves at a fluid-fluid interface [2]. Together with Remco Tuinier, Henk has recently completed a book in this area which is to appear later this year.

A major theme in Henk's research is that of phase transitions in lyotropic liquid crystals. Henk, together with Daan Frenkel and Alain Stroobants, realized in the 1980s that a smectic phase in dispersions of rod-like particles can be stable without the presence of attractive interactions, similar to nematic ordering as predicted earlier by Onsager [3]. Together with Gert-Jan Vroege he wrote a seminal review in this area [4]. Henk once said that 'one can only truly develop one colloidal model system in one's career' and in his case this must be that of gibbsite platelets. Initially Henk's group pursued another polymorph of aluminium hydroxide, boehmite, which forms rod-like particles [5], which already displayed nematic liquid crystal phases. The real breakthrough came when the same precursors treated the produced gibbsite platelets slightly differently. These reliably form a discotic nematic phase [6] and, despite the polydispersity in their diameter, a columnar phase [7].

A theme encompassing a wide range of soft matter systems is that of colloidal dynamics and phase transition kinetics. Many colloidal systems have a tendency

to get stuck in metastable states, such as gels or glasses. This is a nuisance if one wishes to study phase transitions, but it is of great practical significance. Such issues feature in many of Henk's publications, and with Valerie Anderson he wrote a highly cited review in this area [8].

Henk Lekkerkerker has also invested significant effort into the promotion of synchrotron radiation studies of colloidal suspensions. He was one of the great supporters of the Dutch–Belgian beamline 'DUBBLE' project at the ESRF [9]. He attended one of the very first experiments in Grenoble in 1999, which led to a *Nature* publication [7]. He was strongly involved in many other experiments which followed and also has been a member of the beam line board. The most recent synchrotron data are reported in this issue and Henk is a co-author on the paper.

Henk's international leadership in the soft condensed matter field is also illustrated by some of the various roles he has held over the years, such as that of president of the European Colloid and Interface Society 1995–6. He was the heart and soul of the 6th Liquid Matter Conference in Utrecht (2005). For many years he acted as consultant to Schlumberger Cambridge Research. Henk is a towering figure in the scientific community, not just physically but in particular through his intellectual rigour. Henk also took on administrative roles, notably as dean of the chemistry department in Utrecht University and as scientific director of the Debye Institute, and he did these tasks thoroughly and effectively.

Henk is an inspiring teacher and his lectures and notes are always of outstanding clarity. Henk has supervised a series of PhD students and postdoctoral researchers, several of whom have taken up academic positions since. A particular strength of Henk is his phenomenal command of the scientific literature which translates into authoritative introductions to his publications. For example, one of us once came to him saying that he had calculated the scattering profiles for a simple one-dimensional model, which can be applied to describe intra-columnar scattering from a columnar phase of gibbsite platelets. After seeing what the model assumptions were, Henk immediately opened his drawer and quickly found a paper of Zernike and Prins dated 1927 [10]. 'Is this the model you are talking about?' he asked. Of course it was. This was a great lesson, which not only demonstrated Henk's familiarity with the literature but also the effectiveness of his filing system.

A favourite tool of Henk's trade is that of the (mostly handwritten) 'notities' (notes) he would hand or send to his students and collaborators to feed scientific discussions. We have been the grateful recipients of many such notes ourselves. Visitors to Henk's office would often be treated to a demonstration experiment (for instance, birefringent suspensions) and a range of hand-made models designed to illustrate complex concepts (such as multidimensional phase diagrams). Henk's relationship with his students usually extends well after graduation, and many have benefitted from Henk's advice as a mentor.

In spite of his scientific standing, Henk is down to earth; he is a pleasant and warm person, with a deep interest in people. He has many friends all over the world. At the same time, he does not eschew scientific debate. He takes a dim view of pretentious work, especially when it seems that inconvenient data has been neglected. Typically though he will comment in a way that avoids embarrassment and that motivates a redoubled effort.

Henk's career will be celebrated at a symposium to be held in Amsterdam in June 2011. This special issue contains invited contributions by speakers at this symposium, as well as by other collaborators, colleagues, former students, and friends. The authors were free to choose their topics. We have grouped their contributions into a number of themes. The wide range of subjects mirrors Henk's interests and the research themes reviewed above are well represented.

Henk, this special issue is for you—we hope you will enjoy it!

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