

Review Articles about Neutron Reflection

Adrian R. Rennie

This list of publications provides references to a number of review articles that describe neutron reflectivity and its use to investigate interfacial structures. Most of these articles are focused on the application of the method to a particular scientific area and this is indicated in the list.

The short article by [Cubitt et al.](#) provides a brief simple introduction to the technique. It was provided to help readers with little experience to understand a number of papers in a special issue of the journal *Langmuir* (volume 19, issue 19, 2003) that discussed a range of current new developments. Some years later a further special issue of the same journal documented the progress in the area (*Langmuir* volume 25, issue 7, 2009). Many of the articles in these issues of *Langmuir* and in the review articles that are cited in the list below provide further references that can guide the reader to the large number of papers that concern the use of neutron reflectivity in surface and interface science.

References in the list below are sorted chronologically. The citations included in the list are not necessarily comprehensive but rather come from personal reading. Corrections to the list and suggestions for other articles to be included are welcome.

Other documents provide bibliographies of papers that describe [instrumentation](#), [sample environments](#), [theory and calculation methods](#) and [descriptions of software](#) used to analyse data, as well as some relevant [books](#). A short catalogue of www resources in this area has also been made available on the world wide web for a number of years by Rennie:

<http://www.reflectometry.net/reflect.htm>

The information referenced in that catalogue with web links to descriptions of instruments and specific details about analysis software (and downloads) complements the material available in the articles in scientific journal literature.

I would be pleased to learn of corrections to this bibliography and to hear about new articles that could be included.

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Seq. No.	Reference	Digital Source	Year	Topic
1	F. Rondelez, D. Ausserre, H. Hervet 'Experimental Studies of Polymer Concentration Profiles at Solid-Liquid and Liquid-Gas Interfaces by Optical and X-Ray Evanescent Wave Techniques' <i>Ann. Rev. Phys. Chem.</i> 38 , (1987), 317-347.	http://dx.doi.org/10.1146/annurev.physchem.38.1.317	1987	Polymers
2	T. P. Russell 'X-ray and neutron reflectivity for the investigation of polymers' <i>Materials Science Reports</i> , 5 , (1990), 171-271.	http://dx.doi.org/10.1016/S0920-2307(05)80002-7	1990	Polymers
3	J. Penfold, R. K. Thomas 'The application of the specular reflection of neutrons to the study of surfaces and interfaces' <i>J. Phys.: Condens. Matter</i> , 2 , (1990), 1369-1412.	http://dx.doi.org/10.1088/0953-8984/2/6/001	1990	General
4	C. F. Majkrzak 'Polarized neutron reflectometry' <i>Physica B</i> , 173 , (1991), 75-88.	http://dx.doi.org/10.1016/0921-4526(91)90037-F	1991	Polarised
5	J. F. Ankner, C. F. Majkrzak, S. K. Satija 'Neutron Reflectivity and Grazing Angle Diffraction' <i>J. Res. Natl. Inst. Stand. Technol.</i> 98 , (1993), 47-58.	http://dx.doi.org/10.6028/jres.098.004	1993	General
6	H. Zabel 'X-Ray and Neutron Reflectivity Analysis of Thin Films and Superlattices' <i>Appl. Phys. A</i> 58 , (1994), 159-168.	http://dx.doi.org/10.1007/BF00324371	1994	Polarised
7	Hartmut Zabel 'Spin polarized neutron reflectivity of magnetic films and superlattices' <i>Physica B: Condensed Matter</i> , 198 , (1994), 156-162.	http://dx.doi.org/10.1016/0921-4526(94)90151-1	1994	Magnetism
8	Jens Als-Nielsen, Didier Jacquemain, Kristian Kjaer, Franck Leveiller, Meir Lahav, Leslie Leiserowitz 'Principles and applications of grazing incidence X-ray and neutron scattering from ordered molecular monolayers at the air-water interface' <i>Physics Reports</i> 246 , (1994), 251-313.	http://dx.doi.org/10.1016/0370-1573(94)90046-9	1994	GiSANS / GiSAXS
9	Xiao-Lin Zhou, Sow-Hsin Chen, 'Theoretical foundation of X-ray and neutron reflectometry', <i>Physics Reports</i> , 257 , (1995), 223-348.	http://dx.doi.org/10.1016/0370-1573(94)00110-O	1995	General

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Seq. No.	Reference	Digital Source	Year	Topic
10	S. Dietrich, A. Haase, 'Scattering of X-rays and neutrons at interfaces', <i>Physics Reports</i> , 260 , (1995), 1-138.	http://dx.doi.org/10.1016/0370-1573(95)00006-3	1995	General
11	C.F. Majkrzak 'Neutron scattering studies of magnetic thin films and multilayers' <i>Physica B: Condensed Matter</i> , 221 , (1996), 342-356.	http://dx.doi.org/10.1016/0921-4526(95)00948-5	1996	Magnetism
12	J. Penfold, R. M. Richardson, A. Zarbakhsh, J. R. P. Webster, D. G. Bucknall, A. R. Rennie, R. A. L. Jones, T. Cosgrove, R. K. Thomas, J. S. Higgins, P. D. I. Fletcher, E. Dickinson, S. J. Roser, I. A. McLure, A. R. Hillman, R. W. Richards, E. J. Staples, A. N. Burgess, E. A. Simister, J. W. White 'Recent Advances in the Study of Chemical Surfaces by Specular Neutron Reflection'. <i>Journal of the Chemical Society Faraday Transactions</i> . 93 . (1997). 3899-3917.	http://dx.doi.org/10.1039/a702836i	1997	General
13	Wolfgang Knoll 'Interfaces and Thin Films as seen by Bound Electromagnetic Waves' <i>Annu. Rev. Phys. Chem.</i> 49 , (1998), 569-638.	http://dx.doi.org/10.1146/annurev.physchem.49.1.569	1998	General
14	J. F. Ankner, G. P. Felcher 'Polarized-neutron reflectometry' <i>Journal of Magnetism and Magnetic Materials</i> , 200 , (1999) 741-754.	http://dx.doi.org/10.1016/S0304-8853(99)00392-3	1999	Polarised
15	G. P. Felcher 'Polarized neutron reflectometry - a historical perspective' <i>Physica B</i> , 267-268 , (1999), 154-161.	http://dx.doi.org/10.1016/S0921-4526(99)00053-8	1999	Polarised
16	D. G. Bucknall, S. A. Butler, J. S. Higgins, 'Neutron reflectivity of polymer interfaces' <i>Journal of Physics and Chemistry of Solids</i> , 60 , (1999), 1273-1277.	http://dx.doi.org/10.1016/S0022-3697(99)00101-8	1999	Polymers
17	Roger Pynn, Shenda M. Baker, Greg Smith, Mike Fitzsimmons 'Off-Specular Scattering in Neutron Reflectometry' <i>J. Neutron Research</i> , 7 , (1999), 139-158.	http://dx.doi.org/10.1080/10238169908200113	1999	Off-specular

Seq. No.	Reference	Digital Source	Year	Topic
18	C.F. Majkrzak 'Applications of Specular Neutron Reflectometry in Materials Science' <i>J. Neutron Research</i> , 7, (1999), 159-180.	http://dx.doi.org/10.1080/10238169908200114	1999	General
19	Manfred Schalke, Mathias Lösche 'Structural models of lipid surface monolayers from X-ray and neutron reflectivity measurements' <i>Advances in Colloid and Interface Science</i> 88 , (2000), 243-274.	http://dx.doi.org/10.1016/S0001-8686(00)00047-6	2000	Lipids
20	J. R. Lu, R. K. Thomas, J. Penfold 'Surfactant layers at the air/water interface: structure and composition' <i>Advances in Colloid and Interface Science</i> , 84 , (2000), 143-304.	http://dx.doi.org/10.1016/S0001-8686(99)00019-6	2000	Surfactants
21	Michele Sferrazza, Richard A. L. Jones, Jeff Penfold, David B. Bucknall, John R. P. Webster 'Neutron reflectivity studies of the structure of polymer/polymer and polymer/substrate interfaces at the nanometer level' <i>J. Mater. Chem.</i> , 10 , (2000), 127-132.	http://dx.doi.org/10.1039/A904301B	2000	Polymers
22	G. P. Felcher 'Neutron reflectometry as a tool to study magnetism' <i>J. Appl. Phys.</i> 87 , (2000), 5431-5436 .	http://dx.doi.org/10.1063/1.373365	2000	Magnetism
23	Susan Krueger 'Neutron reflection from interfaces with biological and biomimetic materials' <i>Current Opinion in Colloid & Interface Science</i> , 6 , (2001), 111-117.	http://dx.doi.org/10.1016/S1359-0294(01)00073-5	2001	Lipids
24	Giovanna Fragneto-Cusani 'Neutron reflectivity at the solid/liquid interface: examples of applications in biophysics' <i>J. Phys.: Condens. Matter</i> , 13 , (2001), 4973-4989.	http://dx.doi.org/10.1088/0953-8984/13/21/322	2001	Biology
25	Robert Dalgliesh 'Application of off-specular scattering of X-rays and neutrons to the study of soft matter' <i>Current Opinion in Colloid & Interface Science</i> , 7 , (2002), 244-248.	http://dx.doi.org/10.1016/S1359-0294(02)00054-7	2002	Off-specular

Seq. No.	Reference	Digital Source	Year	Topic
26	J. Penfold 'Neutron reflectivity and soft condensed matter' <i>Current Opinion in Colloid & Interface Science</i> 7 , (2002), 139-147.	http://dx.doi.org/10.1016/0921-4526(91)90037-F	2002	Soft Matter
27	R. Cubitt, G. Fragneto, R. E. Ghosh, A. R. Rennie. 'REFILL2002. Advances in the study of interfaces with neutron reflection' <i>Langmuir</i> 19 , (2003), 7685-7687.	http://dx.doi.org/10.1021/la034368w	2003	General, Introduction
28	H. Zabel and K. Theis-Bröhl 'Polarized neutron reflectivity and scattering studies of magnetic heterostructures' <i>J. Phys.: Condens. Matter</i> , 15 , (2003), S505-S517.	http://dx.doi.org/10.1088/0953-8984/15/5/306	2003	Magnetism, Polarised
29	F. Ott, F. Cousin, A. Menelle 'Surfaces and interfaces characterization by neutron reflectometry' <i>Journal of Alloys and Compounds</i> 382 , (2004), 29-38.	http://dx.doi.org/10.1016/j.jallcom.2004.05.046	2004	General
30	M. R. Fitzsimmons, S. D. Bader, J. A. Borchers, G. P. Felcher, J. K. Furdyna, A. Hoffmann, J. B. Kortright, Ivan K. Schuller, T. C. Schulthess, S. K. Sinha, M. F. Toney, D. Weller, S. Wolf 'Neutron scattering studies of nanomagnetism and artificially structured materials' <i>Journal of Magnetism and Magnetic Materials</i> , 271 , (2004), 103-146.	http://dx.doi.org/10.1016/j.jmmm.2003.09.046	2004	Magnetism, Polarised
31	R. K. Thomas 'Neutron Reflection from Liquid Interfaces' <i>Annu. Rev. Phys. Chem.</i> , 55 (2004), 391-426.	http://dx.doi.org/10.1146/annurev.physchem.54.011002.103830	2004	Liquids
32	Tim Salditt 'Thermal fluctuations and stability of solid-supported lipid membranes' <i>J. Phys.: Condens. Matter</i> 17 , (2005), R287-R314.	http://dx.doi.org/10.1088/0953-8984/17/6/R02	2005	Lipids, membranes

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33	M. R. Fitzsimmons, C. F. Majkrzak 'Application of polarized neutron reflectometry to studies of artificially structured magnetic materials' in <i>Modern Techniques for Characterizing Magnetic Materials</i> Yimei Zhu (Ed.) (2005), pp. 107-155 Kluwer, Dordrecht. ISBN: 978-1-4020-8007-4	http://dx.doi.org/10.1007/0-387-23395-4_3	2005	Magnetism
34	C. F. Majkrzak, K. V. O'Donovan, N. F. Berk 'Polarized Neutron Reflectometry' in <i>Neutron Scattering from Magnetic Materials</i> Tapan Chatterji (Ed.) (2006) Chapter 9, pp. 397-471, Elsevier Science, Amsterdam.	http://dx.doi.org/10.1016/B978-044451050-1/50010-0	2006	Polarised
35	Hartmut Zabel 'Neutron reflectivity of spintronic materials' <i>Materials Today</i> 9 , 1-2, (2006), 42-49.	http://dx.doi.org/10.1016/S1369-7021(05)71337-7	2006	Spintronics
36	D. J. F. Taylor, R. K. Thomas, J. Penfold 'Polymer/surfactant interactions at the air/water interface' <i>Advances in Colloid and Interface Science</i> , 132 , (2007), 69-110.	http://dx.doi.org/10.1016/j.cis.2007.01.002	2007	Surfactants, polymers
37	Jian R. Lu, Xiubo Zhao, Mohammed Yaseen 'Protein adsorption studied by neutron reflection' <i>Current Opinion in Colloid & Interface Science</i> , 12 , (2007), 9-16.	http://dx.doi.org/10.1016/j.cocis.2007.02.001	2007	Protein
38	Frédéric Ott 'Neutron scattering on magnetic surfaces' <i>C. R. Physique</i> , 8 , (2007), 763-776.	http://dx.doi.org/10.1016/j.crhy.2007.09.002	2007	Magnetism, Polarised
39	Axel Hoffmann, Gian P. Felcher 'Domain States Determined by Neutron Refraction and Scattering' <i>Novel Techniques for Characterizing and Preparing Samples X-Ray and Neutron Diffraction Techniques</i> John Wiley & Sons, Ltd. (2007).	http://dx.doi.org/10.1002/9780470022184.hmm302	2007	Magnetism
40	Frédéric Ott 'Neutron studies of magnetic oxide thin films' <i>J. Phys.: Condens. Matter</i> 20 , (2008), 264009.	http://dx.doi.org/10.1088/0953-8984/20/26/264009	2008	Magnetism

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41	Tommy Nylander, Richard A. Campbell, Pauline Vandoolaeghe, Marité Cárdenas, Per Linse, Adrian R. Rennie. 'Neutron Reflectometry to Investigate the Delivery of Lipids and DNA to Interfaces – A Review' <i>Biointerphases</i> , 3 , 2, (2008).	http://dx.doi.org/10.1116/1.2976448	2008	Lipids, peptides
42	H. Zabel, K. Theis-Bröhl, M. Wolff, B. P. Toperverg 'Polarized Neutron Reflectometry for the Analysis of Nanomagnetic Systems' <i>IEEE Transactions on Magnetics</i> 44 , (2008), 1928-1934.	http://dx.doi.org/10.1109/TMAG.2008.924538	2008	Magnetism
43	Jeremy H. Lakey 'Neutrons for biologists: a beginner's guide, or why you should consider using neutrons' <i>J. R. Soc. Interface</i> 6 , (2009), S567-S573.	http://dx.doi.org/10.1098/rsif.2009.0156.focus	2009	Biology
44	Gilles Renaud, Rémi Lazzari, Frédéric Leroy 'Probing surface and interface morphology with Grazing Incidence Small Angle X-Ray Scattering' <i>Surface Science Reports</i> 64 , (2009), 255-380.	http://dx.doi.org/10.1016/j.surfrep.2009.07.002	2009	GiSAXS
45	XiuBo Zhao, Fang Pan, Jian R. Lu 'Interfacial assembly of proteins and peptides: recent examples studied by neutron reflection' <i>J. R. Soc. Interface</i> 6 , (2009), S659-S670.	http://dx.doi.org/10.1098/rsif.2009.0168.focus	2009	Proteins
46	C. H. Marrows, L. C. Chapon, S. Langridge 'Spintronics and functional materials' <i>Materials Today</i> 12 , 7-8, (2009), 70-77.	http://dx.doi.org/10.1016/S1369-7021(09)70232-9	2009	Spintronics
47	F. Ott 'Neutron scattering on magnetic nanostructures' <i>These d'Habilitation</i> , (2009), Université Paris Sud - Paris XI.	http://www-llb.cea.fr/habilitations/ott-2009.pdf	2009	Magnetism
48	Hanna P. Wacklin 'Neutron reflection from supported lipid membranes' <i>Current Opinion in Colloid & Interface Science</i> , 15 , (2010), 445-454.	http://dx.doi.org/10.1016/j.cocis.2010.05.008	2010	Lipids

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49	Jeffrey Penfold, Robert K. Thomas 'Mixed surfactants at the air-water interface' <i>Annu. Rep. Prog. Chem., Sect. C</i> , 106 , (2010), 14-35.	http://dx.doi.org/10.1039/b903510a	2010	Surfactants
50	M. A. Kiselev 'Methods for Lipid Nanostructure Investigation at Neutron and Synchrotron Sources' <i>Physics of Particles and Nuclei</i> , 42 , (2011), 302-331.	http://dx.doi.org/10.1134/S1063779611020055	2011	Lipids
51	G. Fragneto 'Neutrons and model membranes' <i>The European Physical Journal Special Topics</i> 213 , (2012), 327-342.	http://dx.doi.org/10.1140/epjst/e2012-01680-5	2012	Lipids, membranes
52	Jeffrey Penfold, Robert K. Thomas, Hsin-Hui Shen 'Adsorption and self-assembly of biosurfactants studied by neutron reflectivity and small angle neutron scattering: glycolipids, lipopeptides and proteins' <i>Soft Matter</i> , 8 , (2012), 578-591.	http://dx.doi.org/10.1039/C1SM06304A	2012	Biosurfactants
53	Thomas Saerbeck, Frank Klose 'Neutron Scattering and Its Application to Investigate Magnetic Thin Film Structures' <i>Procedia Engineering</i> 36 , (2012), 488-495.	http://dx.doi.org/10.1016/j.proeng.2012.03.071	2012	Magnetism
54	Amitesh Paul 'Grazing incidence polarized neutron scattering in reflection geometry from nanolayered spintronic systems' <i>Pramana - Journal of Physics</i> 78 , (2012), 1-58.	http://dx.doi.org/10.1007/s12043-011-0207-z	2012	Spintronics
55	Jeffrey Penfold, Robert K. Thomas 'Neutron reflectivity and small angle neutron scattering: An introduction and perspective on recent progress' <i>Current Opinion in Colloid & Interface Science</i> 19 , (2014), 198-206.	http://dx.doi.org/10.1016/j.cocis.2014.01.002	2014	Soft Matter
56	Frank Heinrich, Mathias Lösche 'Zooming in on disordered systems: Neutron reflection studies of proteins associated with fluid membranes' <i>Biochimica et Biophysica Acta</i> 1838 , (2014), 2341-2349.	http://dx.doi.org/10.1016/j.bbamem.2014.03.007	2014	Membranes, proteins

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57	M. R. Fitzsimmons, Ivan K. Schuller 'Neutron scattering - The key characterization tool for nanostructured magnetic materials' <i>Journal of Magnetism and Magnetic Materials</i> 350 , (2014), 199-208.	http://dx.doi.org/10.1016/j.jmmm.2013.09.028	2014	Magnetism
58	Sara J. Callori, Frank Klose 'The Role of Neutron Scattering in Magnetic Storage Materials Research' <i>IEEE Transactions on Magnetics</i> , 50 , (2014), 6400107	http://dx.doi.org/10.1109/TMAG.2014.2302448	2014	Magnetism
59	Ann Junghans, Erik B. Watkins, Robert D. Barker, Saurabh Singh, Mary Jo Waltman, Hillary L. Smith, Luka Pocivavsek, Jaroslaw Majewski 'Analysis of biosurfaces by neutron reflectometry: From simple to complex interfaces' <i>Biointerphases</i> 10 , (2015), 019014.	http://dx.doi.org/10.1116/1.4914948	2015	Biosurfaces
60	Robert K. Thomas, Jeffrey Penfold 'Multilayering of Surfactant Systems at the Air-Dilute Aqueous Solution Interface' <i>Langmuir</i> 31 , (2015), 7440-7456.	http://dx.doi.org/10.1021/la504952k	2015	Surfactants - multilayers
61	B. P. Toperverg, 'Polarized neutron reflectometry of magnetic nanostructures' <i>Physics of metals and metallography</i> 116 , (2015), 1337-1375.	http://dx.doi.org/10.1134/S0031918X15130025	2015	Magnetism, Polarised
62	Emanuel Schneck, Bruno Demé 'Structural characterization of soft interfaces by standing-wave fluorescence with X-rays and neutrons' <i>Current Opinion in Colloid & Interface Science</i> 20 , (2015), 244-252.	http://dx.doi.org/10.1016/j.cocis.2015.06.001	2015	Fluorescence methods
63	Michael J. Demkowicz, Jaroslaw Majewski 'Probing Interfaces in Metals Using Neutron Reflectometry' <i>Metals</i> 6 , (2016), 20.	http://dx.doi.org/10.3390/met6010020	2016	Metals
64	S. V. Kozhevnikov, F. Ott, F. Radu, 'Neutron methods for the direct determination of the magnetic induction in thick films' <i>Journal of Magnetism and Magnetic Materials</i> 402 , (2016), 83-93.	http://dx.doi.org/10.1016/j.jmmm.2015.11.048	2016	Magnetism