Jan Forsman
Computational Chemistry
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Research

Statistical Thermodynamical research, including development of theoretical methods and tools, such as classical Density Functional Theory, many-body interactions, and simulation methods. These tools are utilized for studies on (for instance) ionic liquids, colloidal dispersions, polymer mediated interactions, electric double layer capacitors, capillary/surface driven phase transitions, and dynamical phases.

Employment

Office director, Professor
Computational Chemistry
Lund University
Lund, Sweden
2015 Sept 21 → present

Post Doc
2000 Oct 29 → 2002 Feb 28

Research outputs

Particle Adsorption Using a Quartz Crystal Microbalance with Dissipation by Applying a Kelvin-Voigt-Based Viscoelastic Model and the Gauss-Newton Method
Furikado, I., Forsman, J. & Nylander, T., 2023 Oct, In: Analytical Chemistry. 95, 41, p. 15286-15292 7 p.

Phase transitions of ionic fluids in nanoporous electrodes
Emrani, A., Woodward, C. E. & Forsman, J., 2023 Oct, In: European Physical Journal E. 46, 10, 91.

Simulations of phase transitions and capacitance, of simple ionic fluids in porous electrodes
Stenberg, S., Vo, P., Woodward, C. E. & Forsman, J., 2023, In: Electrochimica Acta. 437, 6 p., 141440.

Boundary-Monte Carlo Method for Neutral and Charged Confined Fluids
Vo, P., Forsman, J. & Woodward, C. E., 2022 Jun 14, In: Journal of Chemical Theory and Computation. 18, 6, p. 3766-3780 15 p.

Interactions between conducting surfaces in salt solutions
Stenberg, S., Woodward, C. E. & Forsman, J., 2022 Feb 28, In: Soft Matter. 18, 8, p. 1636-1643 8 p.

Overcharging and Free Energy Barriers for Equally Charged Surfaces Immersed in Salt Solutions
Stenberg, S. & Forsman, J., 2021 Dec 14, In: Langmuir. 37, 49, p. 14360-14368 9 p.

Phase Transitions of Oppositely Charged Colloidal Particles Driven by Alternating Current Electric Field
Li, B., Wang, Y. L., Shi, G., Gao, Y., Shi, X., Woodward, C. E. & Forsman, J., 2021 Feb, In: ACS Nano. 15, 2, p. 2363-2373 11 p.

Building polymer-like clusters from colloidal particles with isotropic interactions, in aqueous solution
Haddadi, S., Skepö, M., Jannasch, P., Manner, S. & Forsman, J., 2021, In: Journal of Colloid and Interface Science. 581, p. 669-681 13 p.

Confinement-induced fluid-fluid phase transitions in simple fluid mixtures, under bulk supra-critical conditions
Haddadi, S., Woodward, C. E. & Forsman, J., 2021, In: Fluid Phase Equilibria. 540, 112983.

From Attraction to Repulsion to Attraction: Non-Monotonic Temperature Dependence of Polymer-Mediated Interactions in Colloidal Dispersions
Haddadi, S., Skepö, M. & Forsman, J., 2021, In: ACS Nanoscience AU. 1, 1, p. 69-80

Polymer-Like Self-Assembled Structures from Particles with Isotropic Interactions: Dependence upon the Range of the Attraction
Haddadi, S., Lu, H., Bäcklund, M., Woodward, C. E. & Forsman, J., 2021, In: Langmuir. 37, p. 6052-6061

Structural transitions at electrodes, immersed in simple ionic liquid models
Lu, H., Stenberg, S., Woodward, C. E. & Forsman, J., 2021, In: Soft Matter. 17, 14, p. 3876-3885 10 p.

Non-monotonic phase behaviour of a mixture containing non-adsorbing particles and polymerising rod-like molecules
Thiyam, P., Woodward, C. E. & Forsman, J., 2020 May 15, In: Journal of Colloid and Interface Science. 568, p. 25-35 11 p.

A semi-GCMC simulation study of electrolytic capacitors with adsorbed titrating peptides
Vo, P., Forsman, J. & Woodward, C. E., 2020, In: Journal of Chemical Physics. 153, 17, 174703.

Grand canonical simulations of ions between charged conducting surfaces using exact 3D Ewald summations
Stenberg, S., Stenqvist, B., Woodward, C. & Forsman, J., 2020, In: Physical chemistry chemical physics : PCCP. 22, 24, p. 13659-13665 7 p.

Nanoplatelet interactions in the presence of multivalent ions: The effect of overcharging and stability
Jansson, M., Belić, D., Forsman, J. & Skepö, M., 2020, In: Journal of Colloid and Interface Science. 579, p. 573-581 9 p.

Local Grand Canonical Monte Carlo Simulation Method for Confined Fluids
Vo, P., Lu, H., Ma, K., Forsman, J. & Woodward, C. E., 2019 Dec 10, In: Journal of Chemical Theory and Computation. 15 , 12, p. 6944-6957 14 p.

Intermolecular interactions play a role in the distribution and transport of charged contrast agents in a cartilage model
Algotsson, J., Jönsson, P., Forsman, J., Topgaard, D. & Söderman, O., 2019 Oct 3, In: PLoS ONE. 14, 10, e0215047.

Effect of excess charge carriers and fluid medium on the magnitude and sign of the Casimir-Lifshitz torque
Thiyam, P., Parashar, P., Shajesh, K. V., Malyi, O. I., Boström, M., Milton, K. A., Brevik, I., Forsman, J. & Persson, C., 2019, In: Physical Review B. 100, 20, 205403.

Many-body effects in a binary nano-particle mixture dispersed in ideal polymer solutions
Nguyen, H. S., Forsman, J. & Woodward, C. E., 2019, In: Journal of Chemical Physics. 150, 4, 044906.

Generalized van der Waals Theory of Molecular Fluids in Bulk and at Surfaces
Nordholm, S., Forsman, J., Woodward, C., Freasier, B. & Abbas, Z., 2018 Sept 5, Elsevier. 355 p.

Many-body interactions between charged particles in a polymer solution: the protein regime
Wang, H., Forsman, J. & Woodward, C. E., 2018 May 23, In: Soft Matter. 14, 20, p. 4064-4073 10 p.

A classical density functional theory for the asymmetric restricted primitive model of ionic liquids
Lu, H., Nordholm, S., Woodward, C. E. & Forsman, J., 2018 May 21, In: Journal of Chemical Physics. 148, 19, 193814.

The effect of the relative permittivity on the tactoid formation in nanoplatelet systems. A combined computer simulation, SAXS, and osmotic pressure study
Jansson, M., Thuresson, A., Plivelic, T. S., Forsman, J. & Skepö, M., 2018 Mar 1, In: Journal of Colloid and Interface Science. 513, p. 575-584 10 p.

Ionic liquid interface at an electrode: Simulations of electrochemical properties using an asymmetric restricted primitive model
Lu, H., Nordholm, S., Woodward, C. E. & Forsman, J., 2018 Jan 23, In: Journal of Physics: Condensed Matter. 30, 7, 074004.

Many-body depletion forces of colloids in a polydisperse polymer dispersant in the long-chain limit
Nguyen, H. S., Forsman, J. & Woodward, C. E., 2018, In: Soft Matter. 14, 33

Theoretical study of the effect of π+-π+ association in imidazolium ionic liquids at charged interfaces
Ma, K., Forsman, J. & Woodward, C. E., 2017 Dec 18, In: Physical Review E. 96, 6, 062609.

Molecular Simulations of Melittin-Induced Membrane Pores
Sun, D., Forsman, J. & Woodward, C. E., 2017 Nov 9, In: Journal of Physical Chemistry B. 121, 44, p. 10209-10214 6 p.

Molecular Dynamic Simulations of Ionic Liquid's Structural Variations from Three to One Layers inside a Series of Slit and Cylindrical Nanopores
Ma, K., Wang, X., Forsman, J. & Woodward, C. E., 2017 Jun 29, In: Journal of Physical Chemistry C. 121, 25, p. 13539-13548 10 p.

Anomalous Protein-Protein Interactions in Multivalent Salt Solution
Pasquier, C., Vazdar, M., Forsman, J., Jungwirth, P. & Lund, M., 2017 Apr 13, In: Journal of Physical Chemistry B. 121, 14 , p. 3000-3006 7 p.

Surface forces in electrolytes containing polyions and oppositely charged surfaces
Forsman, J., 2017 Feb 1, In: Current Opinion in Colloid and Interface Science. 27, p. 57-62 6 p.

A classical density functional study of clustering in ionic liquids at electrified interfaces
Ma, K., Forsman, J. & Woodward, C. E., 2017 Jan 1, In: Journal of Physical Chemistry C. 121, 3, p. 1742-1751 10 p.

Ion pairing and phase behaviour of an asymmetric restricted primitive model of ionic liquids
Lu, H., Li, B., Nordholm, S., Woodward, C. E. & Forsman, J., 2016 Dec 21, In: Journal of Chemical Physics. 145, 23, 234510.

Classical Density Functional Theory of Polymer Fluids.
Forsman, J. & Woodward, C., 2016 Dec 18, *Variational Methods in Molecular Modeling.* 1 ed. Singapore: Springer, Vol. 1.

Current understanding of the mechanisms by which membrane-active peptides permeate and disrupt model lipid membranes
Sun, D., Forsman, J. & Woodward, C. E., 2016 Oct 1, In: Current Topics in Medicinal Chemistry. 16, 2, p. 170-186 17 p.

Theoretical and Experimental Investigations of Polyelectrolyte Adsorption Dependence on Molecular Weight
Xie, F., Lu, H., Nylander, T., Wågberg, L. & Forsman, J., 2016 Jun 14, In: Langmuir. 32, 23, p. 5721-5730 10 p.

Theoretical predictions of structures in dispersions containing charged colloidal particles and non-adsorbing polymers
Xie, F., Turesson, M., Woodward, C. E., Van Gruijthuijsen, K., Stradner, A. & Forsman, J., 2016 Apr 28, In: Physical Chemistry Chemical Physics. 18, 16, p. 11422-11434 13 p.

Theoretical Predictions of Temperature-Induced Gelation in Aqueous Dispersions Containing PEO-Grafted Particles
Xie, F., Woodward, C. E. & Forsman, J., 2016 Apr 28, In: The Journal of Physical Chemistry Part B. 120, 16, p. 3969-3977 9 p.

Density functional theory of equilibrium random copolymers: Application to surface adsorption of aggregating peptides
Wang, H., Forsman, J. & Woodward, C. E., 2016 Apr 26, In: Journal of Physics: Condensed Matter. 28, 24, 244011.

A simple and versatile implicit solvent model for polyethylene glycol in aqueous solution at room temperature
Xie, F., Turesson, M., Jansson, M., Skepö, M. & Forsman, J., 2016, In: Polymer. 84, p. 132-137

Fused coarse-grained model of aromatic ionic liquids and their behaviour at electrodes.
Li, B., Ma, K., Wang, Y-L., Turesson, M., Woodward, C. E. & Forsman, J., 2016, In: Physical chemistry chemical physics : PCCP. 18, 11, p. 8165-8173

Non-monotonic temperature response of polymer mediated interactions
Xie, F., Woodward, C. E. & Forsman, J., 2016, In: Soft Matter. 12, p. 658-663

Classical Density Functional Theory of Ionic Solutions
Forsman, J., Woodward, C. & Szparaga, R., 2015 Jan 1, *Computational Electrostatics for Biological Applications.*. Springer, p. 17-38

A Many-Body Hamiltonian for Nanoparticles Immersed in a Polymer Solution
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Amphipathic Membrane-Active Peptides Recognize and Stabilize Ruptured Membrane Pores: Exploring Cause and Effect with Coarse-Grained Simulations
Sun, D., Forsman, J. & Woodward, C. E., 2015, In: Langmuir. 31, 2, p. 752-761

Atomistic Molecular Simulations Suggest a Kinetic Model for Membrane Translocation by Arginine-Rich Peptides
Sun, D., Forsman, J. & Woodward, C. E., 2015, In: The Journal of Physical Chemistry Part B. 119, 45, p. 14413-14420

Electrostatic interactions are important for the distribution of Gd(DTPA)(2-) in articular cartilage.
Algotsson, J., Forsman, J., Topgaard, D. & Söderman, O., 2015, In: Magnetic Resonance in Medicine. 76, 2, p. 500-509

Evaluating Force Fields for the Computational Prediction of Ionized Arginine and Lysine Side-Chains Partitioning into Lipid Bilayers and Octanol
Sun, D., Forsman, J. & Woodward, C. E., 2015, In: Journal of Chemical Theory and Computation. 11, 4, p. 1775-1791

Influence of ion pairing in ionic liquids on electrical double layer structures and surface force using classical density functional approach.
Ma, K., Forsman, J. & Woodward, C. E., 2015, In: Journal of Chemical Physics. 142, 17, 174704.

Multistep Molecular Dynamics Simulations Identify the Highly Cooperative Activity of Melittin in Recognizing and Stabilizing Membrane Pores.
Sun, D., Forsman, J. & Woodward, C. E., 2015, In: Langmuir. 31, 34, p. 9388-9401

On the stability of aqueous dispersions containing conducting colloidal particles.
Szparaga, R., Woodward, C. E. & Forsman, J., 2015, In: Soft Matter. 11, 20, p. 4011-4021

Ionic Liquids and Ionic Liquid + Solvent Mixtures, Studied by Classical Density Functional Theory
Szparaga, R., Woodward, C. & Forsman, J., 2014 May 2, *Electrostatics of Soft and Disordered Matter*. Jenny Stanford Publishing , 12 p.

Classical Density Functional Study on Interfacial Structure and Differential Capacitance of Ionic Liquids near Charged Surfaces
Ma, K., Woodward, C. E. & Forsman, J., 2014, In: Journal of Physical Chemistry C. 118, 29, p. 15825-15834

Classical density functional theory & simulations on a coarse-grained model of aromatic ionic liquids.
Turesson, M., Szparaga, R., Ma, K., Woodward, C. E. & Forsman, J., 2014, In: Soft Matter. 10, 18, p. 3229-3237

Effect of arginine-rich cell penetrating peptides on membrane pore formation and life-times: a molecular simulation study
Sun, D., Forsman, J., Lund, M. & Woodward, C. E., 2014, In: Physical Chemistry Chemical Physics. 16, 38, p. 20785-20795

Exact evaluation of the depletion force between nanospheres in a polydisperse polymer fluid under Θ conditions.
Wang, H., Woodward, C. E. & Forsman, J., 2014, In: Journal of Chemical Physics. 140, 19, 194903.

Role of histidine for charge regulation of unstructured peptides at interfaces and in bulk.
Kurut Sabanoglu, A., Henriques, J., Forsman, J., Skepö, M. & Lund, M., 2014, In: Proteins. 82, 4, p. 657-667

Capillary Condensation of Ionic Liquid Solutions in Porous Electrodes
Szparaga, R., Woodward, C. E. & Forsman, J., 2013, In: Journal of Physical Chemistry C. 117, 4, p. 1728-1734

Fluid-Fluid Transitions at Bulk Supercritical Conditions
Xie, F., Woodward, C. E. & Forsman, J., 2013, In: Langmuir. 29, 8, p. 2659-2666

Perspective: Coulomb fluids-Weak coupling, strong coupling, in between and beyond
Naji, A., Kanduc, M., Forsman, J. & Podgornik, R., 2013, In: Journal of Chemical Physics. 139, 15

Polyelectrolyte Adsorption on Solid Surfaces: Theoretical Predictions and Experimental Measurements
Xie, F., Nylander, T., Piculell, L., Utsel, S., Wagberg, L., Åkesson, T. & Forsman, J., 2013, In: Langmuir. 29, 40, p. 12421-12431

Anisotropic Interactions in Protein Mixtures,: Self Assembly and Phase Behavior in Aqueous Solution
Kurut Sabanoglu, A., Persson, B., Åkesson, T., Forsman, J. & Lund, M., 2012, In: The Journal of Physical Chemistry Letters. 3, 6, p. 731-734

A simple many-body Hamiltonian for polymer-colloid mixtures: simulations and mean-field theory
Forsman, J. & Woodward, C. E., 2012, In: Soft Matter. 8, 7, p. 2121-2130

Attraction between neutral dielectrics mediated by multivalent ions in an asymmetric ionic fluid
Kanduc, M., Naji, A., Forsman, J. & Podgornik, R., 2012, In: Journal of Chemical Physics. 137, 17, 174704.

Density functional theory for Yukawa fluids
Hatlo, M. M., Banerjee, P., Forsman, J. & Lue, L., 2012, In: Journal of Chemical Physics. 137, 6, 064115.

Many-body interactions between particles in a polydisperse polymer fluid
Woodward, C. E. & Forsman, J., 2012, In: Journal of Chemical Physics. 136, 8

Monte Carlo simulations of Donnan equilibrium in cartilage
Algotsson, J., Åkesson, T. & Forsman, J., 2012, In: Magnetic Resonance in Medicine. 68, 4, p. 1298-1302

Polydisperse Telechelic Polymers at Interfaces: Analytic Results and Density Functional Theory
Forsman, J. & Woodward, C. E., 2012, In: Langmuir. 28, 9, p. 4223-4232

Polyelectrolyte adsorption: electrostatic mechanisms and nonmonotonic responses to salt addition.
Forsman, J., 2012, In: Langmuir. 28, 11, p. 5138-5150

Polyelectrolyte Mediated Interactions in Colloidal Dispersions: Hierarchical Screening, Simulations, and a New Classical Density Functional Theory
Forsman, J. & Nordholm, S., 2012, In: Langmuir. 28, 9, p. 4069-4079

Theoretical Prediction of the Capacitance of Ionic Liquid Films
Szparaga, R., Woodward, C. E. & Forsman, J., 2012, In: Journal of Physical Chemistry C. 116, 30, p. 15946-15951

A classical density functional theory of ionic liquids.
Forsman, J., Woodward, C. E. & Trulsson, M., 2011, In: The Journal of Physical Chemistry Part B. 115, 16, p. 4606-4612

Analytical theory of ideal polydisperse polymers at interfaces
Woodward, C. E. & Forsman, J., 2011, In: Physical Chemistry Chemical Physics. 13, 13, p. 5764-5770

Dressed counterions: Polyvalent and monovalent ions at charged dielectric interfaces
Kanduc, M., Naji, A., Forsman, J. & Podgornik, R., 2011, In: Physical Review E (Statistical, Nonlinear, and Soft Matter Physics). 84, 1, 011502.

Depletion interaction between spheres in an ideal equilibrium polymer fluid: Exact asymptotic results
Woodward, C. E. & Forsman, J., 2010, In: Journal of Chemical Physics. 133, 15, 154902.

Differential Capacitance of Room Temperature Ionic Liquids: The Role of Dispersion Forces
Trulsson, M., Algotsson, J., Forsman, J. & Woodward, C. E., 2010, In: The Journal of Physical Chemistry Letters. 1, 8, p. 1191-1195

Dressed counterions: Strong electrostatic coupling in the presence of salt
Kanduc, M., Naji, A., Forsman, J. & Podgornik, R., 2010, In: Journal of Chemical Physics. 132, 12, 124701.

Limitations of the Derjaguin approximation and the Lorentz-Berthelot mixing rule.
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Colloidal interactions in thermal and athermal polymer solutions: The Derjaguin approximation, and exact results for mono- and polydisperse ideal chains
Forsman, J. & Woodward, C. E., 2009, In: Journal of Chemical Physics. 131, 4, 044903.

Density functional theories of surface interactions in salt solutions
Forsman, J., 2009, In: Journal of Chemical Physics. 130, 6

Efficient solution of the self-consistent field theory for block copolymer fluids displaying Schulz-Flory polydispersity
Woodward, C. E. & Forsman, J., 2009, In: Journal of Chemical Physics. 130, 24

Interactions between Surfaces in Polydisperse Semiflexible Polymer Solutions
Woodward, C. E. & Forsman, J., 2009, In: Macromolecules. 42, 19, p. 7563-7570

Simulations of latex particles immersed in dendrimer solutions.
Trulsson, M., Forsman, J., Åkesson, T. & Jönsson, B., 2009, In: Langmuir. 25, 11, p. 6106-6112

Block polyelectrolytes and colloidal stability.
Turesson, M., Åkesson, T. & Forsman, J., 2008, In: Journal of Colloid and Interface Science. 329, 1, p. 67-72

Density functional theory for polymer fluids with molecular weight polydispersity
Woodward, C. E. & Forsman, J., 2008, In: Physical Review Letters. 100, 9, 098301.

Exact density functional theory for ideal polymer fluids with nearest neighbor bonding constraints
Woodward, C. E. & Forsman, J., 2008, In: Journal of Chemical Physics. 129, 5, 054902.

Simulating equilibrium surface forces in polymer solutions using a canonical grid method
Turesson, M., Woodward, C. E., Åkesson, T. & Forsman, J., 2008, In: The Journal of Physical Chemistry Part B. 112, 32, p. 9802-9809

Simulations of surface forces in polyelectrolyte solutions.
Turesson, M., Woodward, C. E., Åkesson, T. & Forsman, J., 2008, In: The Journal of Physical Chemistry Part B. 112, 16, p. 5116-5125

Weak- and strong-coupling electrostatic interactions between asymmetrically charged planar surfaces
Kanduc, M., Trulsson, M., Naji, A., Burak, Y., Forsman, J. & Podgornik, R., 2008, In: Physical Review E (Statistical, Nonlinear, and Soft Matter Physics). 78, 6

A simple correlation-corrected theory of systems described by screened Coulomb interactions
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Simulations and density functional calculations of surface forces in the presence of semiflexible polymers
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Surface forces at restricted equilibrium, in solutions containing finite or infinite semiflexible polymers
Forsman, J. & Woodward, C. E., 2007, In: Macromolecules. 40, 23, p. 8396-8408

Density functional theory for flexible and semiflexible polymers of infinite length
Woodward, C. E. & Forsman, J., 2006, In: Physical Review E (Statistical, Nonlinear, and Soft Matter Physics). 74, 1

Ion adsorption and Lamellar-Lamellar transitions in charged bilayer systems
Forsman, J., 2006, In: Langmuir. 22, 7, p. 2975-2978

Polyelectrolyte mediated forces between macromolecules
Forsman, J., 2006, In: Current Opinion in Colloid & Interface Science. 11, 5, p. 290-294

Repulsion between oppositely charged surfaces in multivalent electrolytes
Trulsson, M., Jönsson, B., Åkesson, T., Forsman, J. & Labbez, C., 2006, In: Physical Review Letters. 97, 6

Surface forces in solutions containing rigid polymers: Approaching the rod limit
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Surface forces mediated by charged polymers: Effects of intrinsic chain stiffness
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Surface transition in athermal polymer solutions
Forsman, J. & Woodward, CE., 2006, In: Physical Review E (Statistical, Nonlinear, and Soft Matter Physics). 73, 5

Prewetting and layering in athermal polymer solutions
Forsman, J. & Woodward, C. E., 2005, In: Physical Review Letters. 94, 11, p. 118301-1-118301-4

A simple correlation-corrected Poisson-Boltzmann theory
Forsman, J., 2004, In: The Journal of Physical Chemistry Part B. 108, 26, p. 9236-9245

Density functional study of surface forces in solutions containing star-shaped polymers
Woodward, C. E. & Forsman, J., 2004, In: Macromolecules. 37, 18, p. 7034-7041

Evaluating the accuracy of a density functional theory of polymer solutions with additive hard sphere diameters
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An improved density functional description of hard sphere polymer fluids at low density.
Forsman, J. & Woodward, C. E., 2003, In: Journal of Chemical Physics. 119, 4, p. 1889-1892

Density functional studies of solvation forces in hard sphere polymer solutions confined between adsorbing walls. I. Solvent effects and dependence on surface potential range.
Forsman, J., Woodward, C. E. & Freasier, B. C., 2003, In: Journal of Chemical Physics. 118, 16, p. 7672-7681

Depletion and structural forces in confined polyelectrolyte solutions
Jönsson, B., Broukhno, A., Forsman, J. & Åkesson, T., 2003, In: Langmuir. 19, 23, p. 9914-9922

Density Functional Study of Surface Forces in Athermal Polymer Solutions with Addititve Hard Sphere Interactions. Solvent Effects, Capillary Condensation and Capillary-Induced Surface Transitions.
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Theoretical Studies of Surface Forces and Phase Equilibria
Forsman, J., 1998, Physical Chemistry 2, Lund University. 200 p.

Awards

Statistical-Mechanical studies of fluids and mixtures
Forsman, J.
Swedish Research Council: SEK3,520,000.00
2022/01/01 → 2026/12/31