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## Forskning

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.

## Anställning

**Avdelningsföreståndare, Professor**
Beräkningskemi
Lunds universitet
Lund, Sverige
2015 sep. 21 → present

## Forskningsoutput

**Exceptionally Strong Double-Layer Barriers Generated by Polyampholyte Salt**
Ribar, D., Woodward, C. E. & Forsman, J., 2025 apr. 3, I: Journal of Physical Chemistry B. 129, 17, s. 4241-4248 8 s.

**Strong electrostatic attraction drives milk heteroprotein complex coacervation**
Vinterbladh, I., Soussi, R. H., Forsman, J., Bouhallab, S. & Lund, M., 2025 jan., I: International Journal of Biological Macromolecules. 286, 137790.

**Cluster Formation Induced by Local Dielectric Saturation in Restricted Primitive Model Electrolytes**
Ribar, D., Woodward, C. E., Nordholm, S. & Forsman, J., 2024 aug. 15, I: The Journal of Physical Chemistry Letters. 15, 32, s. 8326-8333 8 s.

**An efficient method to establish electrostatic screening lengths of restricted primitive model electrolytes**
Forsman, J., Ribar, D. & Woodward, C. E., 2024, I: Physical Chemistry Chemical Physics. 26, 29, s. 19921-19933 13 s.

**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 okt., I: Analytical Chemistry. 95, 41, s. 15286-15292 7 s.

**Phase transitions of ionic fluids in nanoporous electrodes**
Emrani, A., Woodward, C. E. & Forsman, J., 2023 okt., I: 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, I: Electrochimica Acta. 437, 6 s., 141440.

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

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

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

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., I: ACS Nano. 15, 2, s. 2363-2373 11 s.

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

Confinement-induced fluid-fluid phase transitions in simple fluid mixtures, under bulk supra-critical conditions
Haddadi, S., Woodward, C. E. & Forsman, J., 2021, I: 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, I: ACS Nanoscience AU. 1, 1, s. 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, I: Langmuir. 37, s. 6052-6061

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

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

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

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Stenberg, S., Stenqvist, B., Woodward, C. & Forsman, J., 2020, I: Physical chemistry chemical physics : PCCP. 22, 24, s. 13659-13665 7 s.

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

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

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 okt. 3, I: PLoS ONE. 14, 10, e0215047.

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Thiyam, P., Parashar, P., Shajesh, K. V., Malyi, O. I., Boström, M., Milton, K. A., Brevik, I., Forsman, J. & Persson, C., 2019, I: Physical Review B. 100, 20, 205403.

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**A classical density functional theory for the asymmetric restricted primitive model of ionic liquids**
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**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, I: 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, I: 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, I: Physical Review E. 96, 6, 062609.

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

**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 juni 29, I: Journal of Physical Chemistry C. 121, 25, s. 13539-13548 10 s.

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

**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, I: 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 uppl. Singapore: Springer, Vol. 1.

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

**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, I: Physical Chemistry Chemical Physics. 18, 16, s. 11422-11434 13 s.

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Wang, H., Forsman, J. & Woodward, C. E., 2016 apr. 26, I: 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, I: Polymer. 84, s. 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, I: Physical chemistry chemical physics : PCCP. 18, 11, s. 8165-8173

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

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

**A Many-Body Hamiltonian for Nanoparticles Immersed in a Polymer Solution**
Woodward, C. E. & Forsman, J., 2015, I: Langmuir. 31, 1, s. 22-26

**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, I: Langmuir. 31, 2, s. 752-761

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Sun, D., Forsman, J. & Woodward, C. E., 2015, I: The Journal of Physical Chemistry Part B. 119, 45, s. 14413-14420

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Algotsson, J., Forsman, J., Topgaard, D. & Söderman, O., 2015, I: Magnetic Resonance in Medicine. 76, 2, s. 500-509

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Sun, D., Forsman, J. & Woodward, C. E., 2015, I: Journal of Chemical Theory and Computation. 11, 4, s. 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, I: Journal of Chemical Physics. 142, 17, 174704.

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Sun, D., Forsman, J. & Woodward, C. E., 2015, I: Langmuir. 31, 34, s. 9388-9401

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

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Szparaga, R., Woodward, C. & Forsman, J., 2014 maj 2, *Electrostatics of Soft and Disordered Matter.* Jenny Stanford Publishing , 12 s.

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Ma, K., Woodward, C. E. & Forsman, J., 2014, I: Journal of Physical Chemistry C. 118, 29, s. 15825-15834

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Sun, D., Forsman, J., Lund, M. & Woodward, C. E., 2014, I: Physical Chemistry Chemical Physics. 16, 38, s. 20785-20795

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Wang, H., Woodward, C. E. & Forsman, J., 2014, I: 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, I: Proteins. 82, 4, s. 657-667

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

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Xie, F., Woodward, C. E. & Forsman, J., 2013, I: Langmuir. 29, 8, s. 2659-2666

**Perspective: Coulomb fluids-Weak coupling, strong coupling, in between and beyond**
Naji, A., Kanduc, M., Forsman, J. & Podgornik, R., 2013, I: 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, I: Langmuir. 29, 40, s. 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, I: The Journal of Physical Chemistry Letters. 3, 6, s. 731-734

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Kanduc, M., Naji, A., Forsman, J. & Podgornik, R., 2012, I: Journal of Chemical Physics. 137, 17, 174704.

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Hatlo, M. M., Banerjee, P., Forsman, J. & Lue, L., 2012, I: Journal of Chemical Physics. 137, 6, 064115.

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

**Monte Carlo simulations of Donnan equilibrium in cartilage**
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**Polydisperse Telechelic Polymers at Interfaces: Analytic Results and Density Functional Theory**
Forsman, J. & Woodward, C. E., 2012, I: Langmuir. 28, 9, s. 4223-4232

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

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

**Theoretical Prediction of the Capacitance of Ionic Liquid Films**
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**Analytical theory of ideal polydisperse polymers at interfaces**
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**Depletion interaction between spheres in an ideal equilibrium polymer fluid: Exact asymptotic results**
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**Limitations of the Derjaguin approximation and the Lorentz-Berthelot mixing rule.**
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Persson, B., Lund, M., Forsman, J., Chatterton, D. E. W. & Åkesson, T., 2010, I: Biophysical Chemistry. 151, 3, s. 187-189

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Turesson, M., Woodward, C. E., Åkesson, T. & Forsman, J., 2008, I: The Journal of Physical Chemistry Part B. 112, 32, s. 9802-9809

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

**Ion adsorption and Lamellar-Lamellar transitions in charged bilayer systems**
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**Surface forces mediated by charged polymers: Effects of intrinsic chain stiffness**
Turesson, M., Forsman, J. & Åkesson, T., 2006, I: Langmuir. 22, 13, s. 5734-5741

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**Density functional studies of solvation forces in hard sphere polymer solutions confined between adsorbing walls. I. Solvent effects and dependence on surface potential range.**
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## Forskningsmedel

**Statistisk-mekaniska studier av fluider och vätskor**
Forsman, J. (PI)
Swedish Research Council: 3 520 000,00 kr
2022/01/01 → 2026/12/31