SUSAN L. B. REMPE

Distinguished Member of the Technical Staff, Sandia National Laboratories
Adjunct Professor, Department of Biology, University of New Mexico
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(a) Professional Preparation

- Columbia University, New York, NY, Premedical Sciences, B.A. 1987
- University of Montana, Missoula, MT, Chemistry, B.A. 1989
- University of Washington, Seattle, WA, Chemistry, M.S. 1993
- University of Washington, Seattle, WA, Chemistry, Ph.D. 1998
- Los Alamos National Laboratory, Los Alamos, NM, Theoretical Chemistry, Postdoctoral Fellow 1999-2001

(b) Appointments

- Research Professor, Department of Chemical and Biological Engineering and Center for Micro-Engineered Materials, University of New Mexico (UNM), 2015-present
- Adjunct Professor, Department of Biology, UNM, 2014-present
- Wilsmore Fellow, School of Chemistry, U. of Melbourne, Australia, 2012
- Distinguished Member of Technical Staff (less than 10% of SNL), Biological & Engineering Sciences, Sandia National Labs (SNL), 2012-present
- Principal Member of Technical Staff, Biological & Materials Science, SNL, 2006-2011
- Senior Member of Technical Staff, Computational Bioscience, SNL, 2001-2006
- Visiting Research Scientist, School of Chemistry, U. of Melbourne, Australia, 1996

(c) Project Leadership

- Sandia LDRD/**Environment & Climate**, "Bio-inspired ion-selective electrodialysis membranes," **PI**, $2M/3yrs (10/01/2016-9/30/2019).
- Sandia LDRD/**Award for R&D100 Prizes, EC&SP,** "Fundamental properties of confined enzymes," **PI**, $50K/1yr (04/01/2016-9/30/2016).
- Sandia LDRD/**Bioscience**, "Exploiting the microbial Achilles heels for new broad spectrum anti-microbials (NBSAMs)," **PI**, $1.5M/3yrs, (10/1/2015-9/30/2018).
- Sandia LDRD/**Nano-to-Micro**, "Electrochemical detection of single molecules in nanogap electrode fluidic devices," **co-PI**, $1.5M/3yrs (10/01/2014-9/30/2017).
- Sandia LDRD/**New Ideas**, "Probing small-molecule degradation to counter enzyme promiscuity," **PI**, $600K/3yrs, (10/1/2013-10/30/2015).
- Sandia LDRD/**Nuclear Weapons**, "Organosilicon-based electrolytes for long-life Li primary batteries," **co-PI**, $1.3M/3yrs, (10/1/2012-9/30/2015).
- Sandia LDRD/**Materials Science**, "Programmable nanocomposite membranes for ion-based electrical energy storage," **co-PI**, $900K/3yrs, (10/1/2012-9/30/2015).
- Sandia Royalty Funds, **Center for Biological & Material Sciences,** "Commercial biomimetic membrane development," **PI**, collaboration with UNM, $22K/1yr (6/01/2012-5/30/2013).
- Sandia LDRD **Award for R&D 100 Prize/Strategic Partnerships**, "Computational optimization of synthetic water channels," **PI**, collaboration with UNM, $90K/1yr (1/30/2012-9/30/2012).
- Sandia LDRD/**Strategic Partnerships**, "Biotechnology development for biomedical applications," **co-PI**, $400K/6mos (3/15/2010-9/15/2010).
- Sandia LDRD/**Environment, Climate, Infrastructure**, "Programmable nano-materials for reversible CO_2 sequestration," **co-PI**, $1.8M/3yrs (10/01/2009-9/30/2012).

- Sandia LDRD/**Environment, Climate, Infrastructure**, “Understanding and optimizing water flux and salt rejection in nanoporous membranes,” **PI**, $1.5M/3yrs (10/01/2007-9/30/2010).
- Sandia LDRD/**New Directions**, “Block-mediated control of ion flux through channels,” **PI**, $100K/1yr (01/01/2007-09/30/2007).
- Sandia Advanced Concepts **Water Purification Program,** “Biomimetic membranes for desalination,” **PI**, $1.3M/3yrs (10/01/2004-9/30/2007).
- Sandia LDRD/**Environment, Climate, Infrastructure**, “Fuel traps: Mapping stability via water association,” **PI**, $200K/2yrs (10/01/2004-9/30/2006).
- **DTRA JSTO-CBD**, “Advanced therapeutics for exotoxins based on multi-functional mechanistic design principles,” **PI**, $225K/yr (6/15/2016 - 5/15/2017).
- **DTRA JSTO-CBD**, “Understanding selective field-biased gating of biopolymers at confining nanopores,” **co-PI**, $2.5M/5yrs (9/15/2012 - 9/14/2017).
- **DOE Battery Materials Research Program**, “First principles modeling of SEI formation on bare and surface/additive modified silicon anode,” **co-PI**, $1.4M/4yrs (2/2013-12/2016).
- **NSF** CHE-1301072, “The effects of charge transfer on aqueous and ionic systems,” **co-PI**, $450K/3yrs (7/1/2013 - 6/30/2016).
- **NIH Nanomedicine Roadmap**, “Design of biomimetic nanoconductors,” **PI** of Sandia sub-project, $800K/6yrs (10/01/2005 - 9/30/2011).
- **DTRA JSTO-CBD** (#CBS.FATE.03.10.SN.002), “Developing a molecular understanding of water-CWA-surface interactions,” **co-PI**, $600K/1.5yrs (2/2010-9/2011).

(d) Publications (*out of 70, see Google Scholar*)

1. S. Rempe, and J. Vanegas, "Fundamental properties of confined enzymes," *Sandia Technical Report*, SAND2017-0732R (2017).
2. Y. Fu, B. Li, Y.-B. Jiang, D. R. Dunphy, A. Tsai, S.-Y. Tam, B. Li, H. Fan, H. Zhang, D. Rogers, S. Rempe, P. Atanassov, J. L. Cecchi, and C. J. Brinker, “Atomic layer deposition of L-alanine polypeptide,” *J. Am. Chem. Soc.* **136**, 15821-24 (2014).
3. M. Andersen, D. M. Rogers, J. Mai, B. Schudel, A. Hatch, S. B. Rempe, and A. Mani, “Spatiotemporal pH dynamics in concentration polarization near ion-selective membranes,” *Langmuir* **30**, 7902-12 (2014).
4. D. Jiao and S. B. Rempe, “Combined density functional theory (DFT) and continuum calculations of pK_a in carbonic anhydrase,” *Biochem.* **51**, 5979-89 (2012).
5. D. Jiao and S. B. Rempe, “CO_2 solvation free energy using quasi-chemical theory,” *J. Chem. Phys*. **134**, 224506 (2011).
6. R. T. Cygan, C. J. Brinker, M. Nyman, K. Leung, and S. B. Rempe, “A molecular basis for advanced materials in water treatment,” *Mater. Res. Soc. Bull.* **33**, 42-47 (2008).
7. S. Varma, and S. B. Rempe, “Tuning ion coordination architectures to enable selective partitioning,” *Biophys. J.* **93**, 1093-1099 (2007). (Accompanied by a ‘New and Notable’ article by P. Jordan, *Biophys. J.* **93**:1091-1092 (2007).)
8. K. Leung, S. B. Rempe, and C. D. Lorenz, “Salt permeation and exclusion in hydroxylated and functionalized silica pores,” *Phys. Rev. Lett.* **96**, 095504 (2006).

(e) Synergistic Activities

- **Awarded 3** international **R&D 100 Awards** and **2 patents for advances in membrane science**: (i) US Patent (9,242,210) “Enzymatically active high-flux selectively gas-permeable membranes,” (2016); U.S. patent (9,486,742) “Biomimetic membranes and methods of making them," (2016); (ii) **R&D 100 Awards winner** for “Biomimetic Membranes for Water Purification,” (2011); (iii) **R&D 100 Awards winner** in Mechanical/Materials Category and **R&D100 Gold Award Winner in Green Technology** for “CO_2 Memzyme^{TM},” (2015).