PEOPLE

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Women in NSE
Meet Our Students

Sidney Yip

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Education

Ph.D., Nuclear Engineering, Univ. Michigan, 1962.
M.S., Nuclear Engineering, Univ. Michigan, 1959.
B.S., Mechanical Engineering, Univ. Michigan, 1958.

Research Interests

Corrosion, creep and fracture are materials aging and degradation phenomena of concern to Nuclear Science and Engineering. They are also a class of technologically important problems for which molecular-level understanding has not been feasible. However, emerging concepts based on energy landscape modeling and recently developed techniques for sampling transition pathways are making it possible to begin probing the atomistic mechanisms that control stress corrosion cracking and irradiation creep. We are attempting to establish a framework of combining multiphysics modeling with multiscale simulation through our participation in four team projects at the Institute.

Materials Performance and Optimization, Consortium for the Advanced Simulation of Light Water Reactors, DOE Energy Innovation Hub at Oak Ridge National Laboratory (with MIT as a Principal Partner)

Concrete Sustainability Hub, established at MIT by Portland Cement Association and Ready-Mixed Concrete Research and Education Foundation

Transport and Electrocatalytic Activity at Oxide Hetero-Interfaces, DOE-BES-SISGR, Chemomechanics of Far-From-Equilibrium Interfaces

Control of surface film stability – reactivity, H transport, mechanics, BP Materials and Corrosion Center at MIT

Selected Recent Publications

1. A. Kushima, J. Eapen, J. Li, S. Yip, T. Zhu, “Time Scale Bridging in Atomistic Simulation of Slow Dynamics: Viscous Relaxation and Defect Mobility”, *European Physical Journal*, B 82, 271 (2011).
2. J. Li, A. Kushima, J. Eapen, X .Lin, X-F Qian, J. Mauro, P. Diep, S. Yip, “Computing the Viscosity of Supercooled Liquids: Markov Network Model”, *PLoS ONE* 6, e17909 (2011).
3. M. Kabir, T. T. Lau, D. Rodney, S. Yip, K. J. Van Vliet, “Predicting dislocation climb and creep from explicit atomistic details”, *Physical Review Letters*, 105, 095501 (2010).
4. T. T. Lau, A. Kushima, S. Yip, “Atomistic Simulation of Creep in a Nanocrystal”, *Physical Review Letters,* 104, 175501 (2010).
5. P. R. Monasterio, T. T. Lau, S. Yip, K. J. Van Vliet, “Hydrogen-Vacancy Interactions in Fe-C Alloys”, *Physical Review Letters*, 103, 085501 (2009).
6. S. Yip, “Multiscale Materials”, in *Multiscale Methods*, J. Fish, ed. (Oxford Univ. Press, New York, 2009), Chap. 14, pp. 481 – 511.

Research profiles:

Understanding and predicting materials behavior: NSE takes an interdisciplinary approach

Labs + Groups

Atomistic Simulation of Materials Group

Concrete Sustainability Hub

Consortium for Advanced Simulation of Light Water Reactors (CASL)

Recent News

Size diversity in cement nanoparticles optimizes packing density to give concrete its strength

Probing the mysteries of cracks and stresses

NSE’s Professor Sidney Yip wins 2012 Robert Cahn Award

Richard K. Osborn Memorial Lectureship Endowed

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