

**Amy Karlsson**

Assistant Professor

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Biomolecular EngineeringUniversity of Maryland
College Park, MD

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11:00 a.m.

171 Durham Center

Iowa State University

Energizing Peptides to Target Fungal Pathogens

Protein engineering offers powerful approaches to designing proteins and peptides as molecular tools for a wide range of biological applications. Our lab uses engineered proteins and peptides to study biological systems and design improved therapeutics and diagnostics. One focus of our work is engineering peptides for improved interactions with *Candida* fungal pathogens. *C. albicans* and other *Candida* species are human commensal organisms but can cause disease when patients are immunocompromised. Increasing drug resistance and the limited number of available antifungal agents necessitate the search for new therapeutic strategies. To address current therapeutic challenges, we are improving the properties of the human salivary peptide histatin 5, which has antifungal activity against *C. albicans*. Although histatin 5 has promise as a therapeutic agent, the fungus produces secreted aspartic proteases that degrade the peptide and reduce its antifungal activity. Our analogs of histatin 5 offer strong resistance to the fungal proteases without reducing antifungal activity. We are investigating the use of these analogs for treating and preventing disease, while also improving understanding of how the secreted aspartic proteases recognize and cleave peptide substrates. In addition to exploring peptides as potential therapeutics, we are also using peptides to target and deliver bioactive molecules to *Candida* pathogens. We are examining how properties of these cell-penetrating peptides affect their translocation across the cell wall and cell membrane of *Candida* cells and are defining the types of cargo that can be delivered into fungal cells. By applying protein engineering strategies to designing peptides for targeted interactions with fungal cells, we are gaining information on structure-function relationships that will enable more efficient design of biomolecules for specific interactions with biological systems.

Dr. Amy J. Karlsson received her bachelor's degree in chemical engineering from Iowa State University in 2003 and then joined Prof. Sean Palecek's group at the University of Wisconsin, where she received her PhD in chemical engineering in 2009. Following her doctoral work, she was an NIH Ruth L. Kirschstein Postdoctoral Fellow in Prof. Matt DeLisa's lab at Cornell University. Dr. Karlsson joined the Department of Chemical and Biomolecular Engineering at the University of Maryland as an assistant professor in 2012. Her group's research lies at the interface of biology and engineering and uses protein engineering strategies to improve the understanding of human diseases and develop tools for drug design and disease diagnosis.

The Graduate Seminar Series events are part of the required curriculum for chemical engineering graduate students, but open to all Iowa State University graduate students, post-doctoral researchers, scientists, faculty and staff. See the full seminar schedule at cbe.iastate.edu/semnar-series/