

BIOGRAPHICAL SKETCH

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NAME: Hans F. Schmitthenner

eRA COMMONS USER NAME: SCHMITTHENNERH

POSITION TITLE: Associate Research Professor

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Massachusetts Institute of Technology	B.S.	1975	Chemistry
The Pennsylvania State University	Ph.D.	1980	Organic Chemistry
University of Rochester	Post-doc	1981	Organic Chemistry

NOTE: The Biographical Sketch may not exceed five pages. Follow instructions below.

A. Personal Statement

I am an associate research professor in my fifth year at RIT after transitioning from an industrial career in Medicinal and Imaging Chemistry at AstraZeneca, Kodak and Carestream Molecular Imaging. My research field is molecular imaging agent synthesis and I am a research mentor for ten Chemistry undergraduates, two MS students and two Biology students. My trademark is an excellent rapport with students and the ability to streamline their training into advanced research based on my experience in mentoring co-ops. I have an interest in deaf students in STEM. I have taken three American Sign Language classes at RIT-NTIC and interact well with DHH students. The field of molecular imaging *combines a passion in three areas* developed in my career: *imaging chemistry* including targeted agents; *medicinal chemistry*; and *instrumental analysis*. In my last position I designed and synthesized conjugates of dyes and targeting peptides and antibodies for customers. It is the requests for custom targeted agents from customers that sparked my interest in the design of compact imaging agents. In addition to research I am an expert in HPLC and LC-Mass Spec. My former companies have donated equipment and instrumentation to set up my current laboratory. My lab and set of skills provides an ideal background to mentor students and provides an excellent environment for students to learn imaging agent synthesis and evaluation. I collaborate with cancer biologists and optical imaging engineers at URMC and Roswell Park on photoacoustic imaging (PAI) of Prostate (PrCa) and extended this to magnetic resonance imaging (MRI) and PAI-MRI of PrCa and breast cancer (BrCa). Six of my seniors entered Ph.D. programs last year and three have been accepted this year. I have two patent applications with students as inventors. Two of my students were finalists, coming in third place in a "Tiger Tank" competition, pitching a business plan to synthesize and market two targeted molecular imaging agents for cancer detection. These are examples of what students working with me can accomplish.

- Dogra, V, Chinni, B., Singh, S, Schmitthenner, H., Rao, N, Krolewski, J, Nastiuk, K, Photoacoustic Imaging with an Acoustic Lens Detects Prostate Cancer Cells Labeled with PSMA-targeting Near Infra-red Dye-conjugates, *Journal of Biomedical Optics* (2016), 21(6), 66019. <https://www.ncbi.nlm.nih.gov/pubmed/27367255>
- Loaded Latex Optical Molecular Imaging Probes Containing Lipophilic Large Stokes Shift Dyes (US Appl 2012/0058050 A1,) , Toa Ji, Schmitthenner, Hans F., Yang Yonghong, Harder, John W., (Carestream Health, Bruker Biospin 2013)
- Large Stokes Shift Dyes used for Optical Imaging, U.S. Patent 8,017,104 (Wang, Ruizheng; Harder, John W., Stegman, D.A., Harrison, Wm. J, Schmitthenner, Hans F. (Carestream Health, Bruker Biospin, September 2011).

B. Positions and Honors

- 1981-1983 Assistant Professor at St. John Fisher College, Rochester, NY
- 1983-1987 Research Scientist at Pennwalt Pharmaceuticals, Rochester
- 1987-1995 Research Scientist at Fisons Pharmaceuticals, Rochester
- 1995-1999 Principal Scientist at AstraZeneca Pharmaceuticals, Rochester
- 1999-2008 Principal Scientist at Kodak, Rochester, NY
- 2008-2009 Sr. Principal Scientist at Carestream Health, Rochester, NY
- 2009-2010 Sr. Principal Scientist at Carestream Molecular Imaging, New Haven, CT
- 2011-2014 Chemistry and Imaging Research Scientist, SCMS and CIS, R.I.T
- 2015 Associate Research Professor, SCMS and CIS, R.I.T
- 2007 Gold Team Achievement Award, Optical Molecular Imaging Agents Probe Team
- 2007 Invited Keynote Speaker at Water Inform 2007
- 2011-2015 Member of World Molecular Imaging Society

C. Contribution to Science

1. My most recent contribution has been to develop a research program involving versatile targeted molecular imaging agents (TMIA). In doing so I have engaged over 20 students in Chemistry, Biology and Imaging Science at RIT and forged collaborations with three professors in Biology (Cell Culture and Confocal Fluorescence Microscopy, CFM), Chemistry (Magnetic Resonance Imaging. MRI) and Imaging Science (Photoacoustic Imaging. PAI) as well as cancer research biologists and the University of Rochester and Roswell Park Cancer Research Institute. We were the first to image cancer cells with TMIA at RIT by confocal microscopy, we developed a micro-screen for measuring T1 relaxation times of our gadolinium contrast agents for MRI, and we were the first to utilize a TMIA for the PAI of prostate cancer.

2. A significant aspect of the chemistry imaging agents research program was the development of the first truly modular synthesis of versatile TMIA including targeted multi-modal molecular imaging agents. Our novel approach may be utilized for combining two different dyes, metals, or dyes with metals, and follow this with the conjugation of a variety of targeting groups in the last step to thereby use a given imaging system for multiple targets. The modalities we have incorporated are optical imaging, photoacoustic imaging, PET and MRI. While we are writing the manuscript presently we have submitted two patent applications and have presented our discoveries at the World Molecular Imaging Conference.

- Modular Imaging Agents Containing Amino Acids and Peptides, (US Appl. 2015/0038672 A1) , Schmitthenner, H., **Beach, Stephanie., Weidman, Chelsea, Barrett Taylor M**, (Rochester Institute of Technology 2015)
- Transmetalation Methods for the Synthesis of PET and SPECT Imaging Agents, (US Appl. 15/055,203 A1), Schmitthenner, H, **Sweeney, AM**, Williams, S. (Rochester Institute of Technology 2016)
- Schmitthenner, H., **Barrett, T., Beach, S., Heese. L., Weidman, C., Sweeny-Jones, A.M, Becker, A**, Hornak, J., **Ophardt, H.**, Evans, I., Modular Synthesis of Peptide-based Single and Multimodal targeted Molecular Imaging Agents, World Molecular Imaging Conference, 537, Honolulu, HI 2015

3. In the mid 2000's I was a member of a start-up optical molecular imaging group which spun out of Kodak to become Carestream Molecular Imaging. A novel nanoparticle system was developed as a carrier for near-infrared dyes which enabled targeted optical imaging both in-vitro and in-vitro. A novel "large Stoke's shift" dye was also developed, patented and marketed. The trade name was Xsight for both nanospheres and large Stoke's shift dyes. In 2007 this group was awarded the Gold Team achievement award for being the most innovative in all of Kodak research. My role in this group was primarily in the synthesis and purification of materials and quality control. When my group was relocated to Connecticut my role grew to many facets including design and synthesis, purification and quality control, and mentoring of three new Ph.D. scientists as well as interacting with customers.

- Orton, Sean P.; Van Praagh, Andrew D.G.; Potenza, Joan C.; Schmitthenner, Hans F.; Mclaughlin, William E.; Leevy, W. Matthew Broad Based Tissue Uptake of Polycationic Near-Infrared Polymeric Nanoparticles in Living Mice, *Journal of Biomedical Nanotechnology*, Volume 9, Number 1, January 2013 , pp. 77-85
- Loaded Latex Optical Molecular Imaging Probes Containing Lipophilic Large Stokes Shift Dyes (US Appl 2012/0058050 A1,) , Toa Ji, Schmitthenner, Hans F., Yang Yonghong, Harder, John W., (Carestream Health, Bruker Biospin 2013)
- Large Stokes Shift Dyes used for Optical Imaging, U.S. Patent 8,017,104 (Wang, Ruizheng; Harder, John W., Stegman, D.A., Harrison, Wm. J, Schmitthenner, Hans F. (Carestream Health, Bruker Biospin, September 2011).

4. In the early 2000's at Kodak I was involved with a group initiating combinatorial chemistry at Kodak. I became an expert at automated synthesis and auto-purification by preparative HPLC and this enabled the construction of libraries of compounds which could be screened for photographic and digital imaging.

- Synthesis of Peptoid Substituted Azole Compounds, US6946562B2, Diehl, Donald R., Schmitthenner, Hans F., Sonnefeld, William J., Dunlap, Richard P. (Eastman Kodak Company, 2005)
- Imaging Materials Containing Peptoid Substituted Azole Couplers, US6514679B2, Diehl, Donald R., Schmitthenner, Hans F., Sonnefeld, William J., Dunlap, Richard P. (Eastman Kodak Company, 2003).
- Solubilized Dyes, US7056375B2, Potenza, Joan. C., Madaras, Marcel, B., Schmitthenner, Hans. F., Southby, David, T., (Eastman Kodak Company, June, 2006).

5. In the 1990's I was a principal scientist at Astra prior to its merger with AstraZeneca. During this time I developed a new peptidomimetic template to mimic gamma and beta turns in peptides and proteins.

- 1,2,4-Triazin-6-ones As Peptidomimetic Templates for Cholecystokinin-A Agonists, H.F. Schmitthenner," K.G. Doring, E.S. Downs, and J.D. Rosamond, *Peptides, Chemistry, Structure and Biology*, Mayflower Sc.Ltd., (1996)
- 1,2,4-Triazinone Peptide Derivatives and their use in Therapy, WO9418229, Rosamond, J., Schmitthenner, Hans F. (Fisons, 1994)

D. Research Support

Ongoing Research Support:

1R15CA192148-01

Schmitthenner (PI)

09/16/2014-08/31/2017

Targeted Molecular Agents for Photoacoustic Imaging of Prostate Cancer; H. Schmitthenner, PI. The goal of this proposal is to design and create targeted molecular imaging agents for the selective imaging of prostate cancer based on targeting PSMA receptors. Our novel modular synthetic approach to peptide-based molecular imaging agents combined with our collaborator's novel photoacoustic lens technology is being utilized to develop new approaches to targeted photoacoustic and confocal microscopic imaging to revolutionize the early detection of prostate cancer and will be useful in guiding biopsies and for active surveillance.

Completed Research Support:

Dean's Research Initiation Grant (D-RIG) College of Science, RIT, 11/12-10/13 : A cross-disciplinary grant to initiate work on Targeted Molecular Imaging Agents. "*Peptide Scaffolds for Targeted Molecular Imaging Agents*", H. Schmitthenner, PI.

This grant was seed funding to initiate a research program at RIT on targeted molecular imaging with the goal of obtaining useful preliminary results to enable NIH/NSF/DOD grant applications. The project was highly successful and resulted in the modular method for the synthesis of targeted molecular imaging agents (TMIA's).

Grant Writers Boot-camp Seed Funding Award, 12-2011 through 12-2012. "New *Peptide Scaffolds for Targeted Molecular Imaging Agents*", H. Schmitthenner, PI.

This grant was seed funding to initiate a research program at RIT on targeted molecular imaging with the goal of obtaining useful preliminary results to enable NIH/NSF/DOD grant applications. The project was highly successful and resulted in the first confocal microscopy images of targeted lung cancer cells.