

William C. Howland III, PhD

PATENT AGENT

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Dr. William Howland assists Choate's life sciences clients by utilizing his background in chemistry to help with the preparation and prosecution of patent applications, as well as freedom-to-operate and patentability analyses.

William received his bachelor of science in chemistry from the University of North Carolina at Chapel Hill. During his undergraduate degree, he worked as a research assistant for Professor Jillian Dempsey in the Department of Chemistry. In this position, he synthesized, purified, and characterized a library of organic heterocyclic compounds. He also developed skills in organic synthesis, NMR spectroscopy, air-free inorganic synthesis, column chromatography, recrystallization, UV-vis spectroscopy, and cyclic voltammetry. Furthermore, William gained experience in an international work environment as an NSF IREU Fellow at Universität Ulm in Germany while synthesizing polyoxometalate-containing model complexes to study photocatalytic hydrogen evolution by metal oxides.

After his undergraduate degree, William received his PhD in chemistry from the Massachusetts Institute of Technology. As a graduate research assistant for Professor Yogesh Surendranath, he rationalized the activity of earth-abundant oxidation catalysts by their electrocatalytic activity, instigating a burgeoning area of research within the group. Additionally, he investigated the use of annealing procedures to rationally influence the surface crystallographic texture of polycrystalline platinum. He developed skills in electrolysis, kinetic analysis, scanning electron microscopy, electron backscatter diffractometry, rotating disc electrode voltammetry, and numerical modeling using Python. While pursuing his PhD, William completed courses for understanding patent law through MIT Sloan School of Management.

Focus Areas

Intellectual Property

IP Counseling

Publications and Presentations

- "Mechanisms of Thermal Redox Catalysis Enabled by Metallic Band Structure," presenter, Seminar for the MIT Department of Chemistry, December 2022
- "Thermal Catalysis on Co/N-doped Carbon as Electrochemical Band-Mediated Half-Reactions," presenter, Gordon Research Conference on Electrochemistry, September 2022
- "Thermal Hydroquinone Oxidation on Co/N-doped Carbon Proceeds by a Band-Mediated Electrochemical Mechanism," first author, *Journal of the American Chemical Society*, June 2022
- "Understanding Aerobic Oxidation on Metal/N-Doped Carbon as Band-Mediated Half-Reactions," presenter, Inorganic Departmental Seminar for the MIT Department of Chemistry, October 2021
- "Thermochemical Aerobic Oxidation Catalysis in Water Can be Analysed as Two Coupled

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Electrochemical Half-Reactions," co-author, *Nature Catalysis*, September 2021

- "Redox-Induced Structural Reorganization Dictates Kinetics of Cobalt(III) Hydride Formation via Proton-Coupled Electron Transfer," co-author, *Journal of the American Chemical Society*, March 2021
- "A Local Short Circuit Model for Quantitative Analysis of Redox-Mediator-Driven Heterogeneous Catalysis," presenter, Energy Frontiers Research Center Principal Investigators' Meeting, July 2019
- "Probing Hydride Formation Kinetics of Cobalt Complexes: Fulfilling the Need for Speed in Efficient Artificial Photosynthesis," presenter, Solar Energy Research Center Conference
- "Proton-Coupled Electron Transfer Reactions with Photometric Bases Reveal Free Energy Relationships for Proton Transfer," co-author, *The Journal of Physical Chemistry B*
- "POM-Photosensitizer Systems for Hydrogen Reduction in Ulm um Ulm und um Ulm herum," presenter, ACS National Meeting
- "Molecular Models for the Study of Hydrogen Production by Metal Oxides with Covalently-Linked Metal Oxides," presenter, ACS National Meeting
- "Photometric Bases: Tunable Probes for Monitoring Proton Transfer Reactions," presenter, Joint NC State and UNC Charlotte Photochemistry Symposium

Education & Credentials

- Massachusetts Institute of Technology, PhD (2023) Chemistry
- University of North Carolina Chapel Hill, BS (2017) with the highest honors and highest distinction, Chemistry

Admissions

- U.S. Patent & Trademark Office