161. Josiah Sinclair, Physics **Calvin College**

(Co-Authors: Loren Haarsma and Paul Moes)

"Electrophysiological evidence for normal proportions of inhibitory (GABA) intra-hemispheric synaptic connections following abnormal development of corpus callosum axons"

Agenesis of the corpus callosum (AgCC) occurs in humans and mice when growing axons fail to cross the midline to connect left and right cortical areas. These misguided fibers form bilateral pathways, known as Probst Bundles (PB's), which run anterior-to-posterior near the medial cortical surface. AgCC symptoms overlap with autism-spectrum disorder traits, but researchers have speculated that individuals with PB's, have less severe symptoms than those without. Previous research has established that the axons of the PB fibers conduct action potentials, but no studies have determined if PB fibers make functional connections with layer V pyramidal cells. The present study used electrical stimulation of PB axons in mouse brain slices and patch-clamp electrophysiology to examine the existence of inhibitory post-synaptic currents (e.g., GABA-mediated responses) in cortical cells, and to examine the location and nature of these inhibitory responses. As with normal corpus callosum pathway stimulation, stimulation of PB axons produced very few GABA-mediated responses in layer V pyramidal cells. Together with other outcomes from the present study, the low number of GABA-mediated responses suggests that the resulting intra-hemispheric connections mirror normal inter-hemispheric connections, despite their abnormal growth patterns.

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"Characterization of Electrodeposited Nanoporous Ni and NiCu Films"

Nanoporous thin films are interesting candidates to catalyze certain reactions because of their large surface areas. This specific project focuses on the deposition of Ni and NiCu thin films on a Au substrate and further explores the catalysis of the hydrogen evolution reaction (HER). Depositions are created using controlled potential electrolysis, a process where the potential at which the metal alloy deposition occurs is set and the length of time or total charge of the deposition is adjusted. Samples are then dealloyed using either DC potential amperometry with an applied constant potential or cyclic voltammetry for linear sweeping. Before and after the dealloying, all the samples are characterized using multiple techniques. Electrochemical capacitance measurements allow comparisons of sample roughness. HER measurements characterize the reactivity of the sample with respect to the specific catalytic reaction. The Tafel equation is fit to the data to obtain information about the kinetics of the HER of the samples. Other methods for characterizing the samples include scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS). The use of SEM allows images to be taken of the deposition to determine the change in the structure pre- and post- dealloy of the sample. EDS allows the elemental composition of the deposition to be determined before and after the dealloy stage.