32b Examining Rhodium Catalyst Complexes for Use with Conducting Polymers Designed for Fuel Cells in Preparing Biosensors

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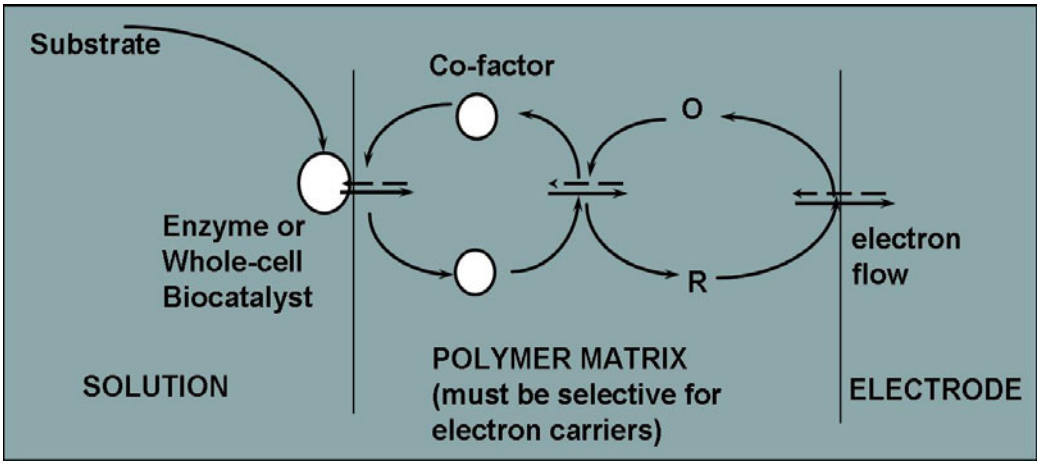
Biosensing devices are important because they can detect, record, and transmit information regarding the presence of, or physiological changes in, different chemical or biological materials in the environment. The goal of this research is to prepare a biosensing device that is effective, quick, and low cost. This is done by examining which chemicals will work best when placed in a biosensor. The first study involved experimenting on a rhodium catalyst complexed with ligands such as bipyridine and imidazole. The rhodium catalyst is important because it is reduced from Rh^{III} to Rh^{I}, forms a hydride by reaction with water and releases the hydride to react with nicotinamide adenine dinucleotide (NAD^{+}) to selectively produce 1,4-NADH, the reduced form of NAD^{+}. The second study looked at different types of ketones and enzymes for the enzyme-substrate reaction converting a ketone into an alcohol. Preliminary results showed that the rhodium complexed with bipyridine was able to carry out all the reactions, while the rhodium complexed with imidazole was not able to produce and release hydrides. In addition, the most effective ketone to use is benzylacetone with the enzyme alcohol dehydrogenase from baker's yeast. Future work includes experimenting with bis-imidazole, which mimics the structure of bipyridine to see if it has the capability to reduce and if the reduction rate is comparable to the bipyridine complex. Once all testing is completed, the fastest catalysts will be combined with polymer membranes designed for fuel cells to prepare biosensing devices that can be used in a variety of applications including ones in the medical and environmental fields.



Schematic of a Typical Biosensor