

No existing model describes an identified special case of enzyme behavior when directly stimulated with thermal energy via an RF field.

The ability to remotely influence cellular functions and outcomes is a new approach to targeted medicine. Nano-medicine and biotechnology are the future of medical diagnostics and treatment. The ability to remotely influence cellular functions and outcomes is a new approach to targeted medicine. Direct heating of an enzyme vs bulk heating changes the enzyme activity.

I tested how direct transfer of thermal energy changes rates of enzyme reactions. We created samples of enzymes, attached to ferrous (magnetic) nano-particles, and substrate. We exposed some of the samples to RF heating for 10 minutes. The remaining samples were exposed to traditional bulk heating methods. We measure the enzyme activity in each scenario using a calorimetric assay and optical absorbance activity.

In contrast to heating in solution, thermal energy imparted to the enzyme reaction does not include direct contributions to the enzyme's diffusion or rotation. Instead, only the internal thermal energy will be changed. We suspect that this hot enzyme in a cold substrate will exhibit non-canonical behavior. If enzyme activity after RF heating is different than that of bulk heating, we will know we have identified an example of non-canonical behavior. Then we use theory to create a new model to describe this behavior.