7D-GRID-AI TECHNOLOGY: A TECHNOLOGY THAT TRANSLATES ENZYMES FROM A COMPUTER TO BUSINESS WITH LIMITED LAB EXPERIMENTS

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7D Grid Technology is a rapidly evolving artificial intelligence-based method used for designing industry-ready enzymes. It uses quantum mechanic probes to “capture information across the enzymatic reaction and across the enzyme-substrate system”. This information is used by AI methods such as convolutional neural networks and support vector machines, to predict the kinetic properties of the enzyme. The method is efficient to differentiate enzymes with high activity and enzymes with low activity, a precursor for making focused enzyme libraries. It is used as a partial de-novo designer to predict substitutions and come up with enzyme variants that show promiscuous activity (gram scale) to kilogram scale substrate conversion. We have successfully engineered transaminases, lipases, ketoreductases, alcohol dehydrogenases and fluorinases using this technology. Here we would like to present the engineering of an alcohol dehydrogenase which is now used to produce an economically important API. The enzyme from a lab-scale activity to industrial-scale activity was achieved with just 40 enzyme variants tested in the lab. Here we have demonstrated 1kg of the substrate to product conversion using an optimized enzymatic process that fits the cost window of the customer.

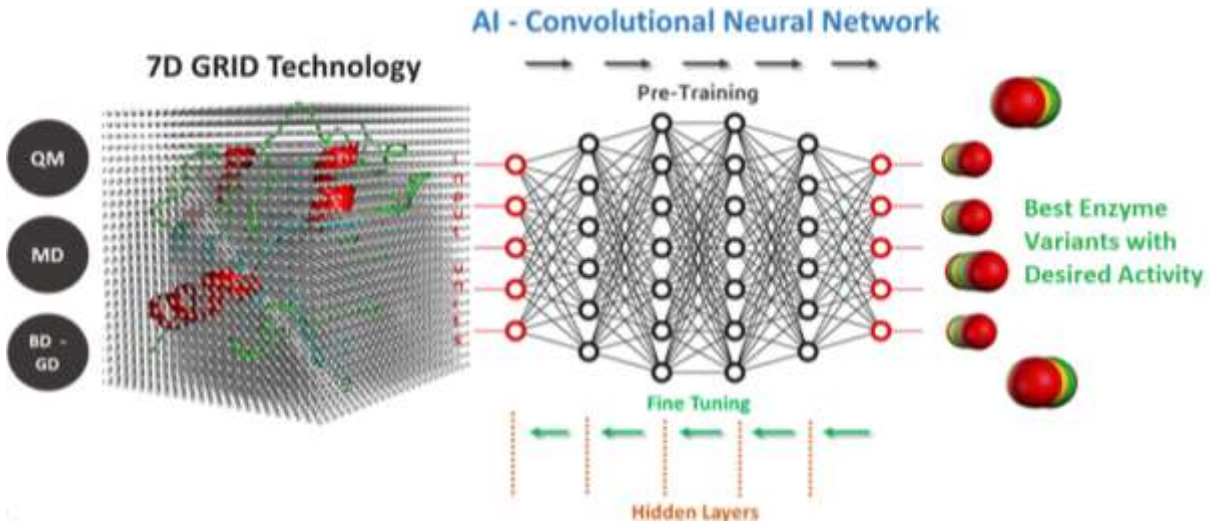

Figure 1 – 7D Grid engineering of an enzyme with quantum mechanics probes and artificial intelligence techniques to predict best enzyme variants with the desired activity