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Investigation and calibration of nonessential amino acids using a custom built Raman spectroscopy system

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Abstract

Nonessential amino acids (NEAAs) are the building blocks for producing proteins of various functionalities within living systems. For example, from NEAAs, humans produce proteins that are important for cell repair, cell division and synthesis of hormones paramount to maintaining a healthy body. Understanding the chemical properties of NEAAs can therefore allow a thorough investigation of biological processes in the cases of ailing individuals. Raman spectroscopy has become a powerful technique for characterizing various organic compounds such as NEAAs, relying on their unique light scattering properties. In this study we present a custom built Raman Spectroscopy system which was used to investigate and calibrate a group of NEAAs through a comparison of peak area versus concentration. The results show that various regions of interest within the sample mixtures exhibit an increase in signal intensity when the concentration is increased. This is in agreement with current literature on the parameters that effect Raman systems such as concentration. Secondly, it was observed that 0.1 mM of NEAAs was the current detection limit of the system in terms of number of significant peaks produced. As a result, it is important that future work includes incorporating nanomaterials as sample scaffolds for signal enhancement to improve sensitivity. Much of this work is intended towards producing a point-of-care diagnostic tool for analysis of cancer agents.