

# Chemical Engineering Thesis Defense

Point-of-care Sensor for Creatinine Detection

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## Abstract

Cardiovascular disease is affecting millions of people worldwide and is the leading cause of death in the United States. This disease is closely related to the abnormal creatinine levels in blood. For this reason, there is a need for a low-cost point-of-care device that could measure the creatinine level in blood with the goal of managing and preventing cardiovascular disease. This project introduces a Molecular Reactive Lateral Flow Assay (MoReLFA) device that is aimed toward creatinine detection based on an optimized chemical reaction of creatinine and alkaline picrate. The device consists of different membranes that accommodate 50 microliters of fluid sample and carry out a colorimetric reaction, in which deposited-colored region is analyzed for Red, Green, and Blue (RGB) components via an image processing software. The color intensity from the RGB outputs was then studied and compared with a gold standard spectrophotometry-based technique. The results show that the MoReLFA sensor could successfully detect creatinine levels in standard solutions. The plot of the sensor color intensity against the absorbance from spectrophotometry shows a good correlation between the two methods ( $R^2 = 0.96$ ). Furthermore, the paper introduces the development of a RGB reader box that is portable and for easy assessment of RGB values. The color intensity from the box shows an increasing trend with increasing creatinine concentrations; and the coefficient of determination of this relationship is 0.85.



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Zoom Link: <https://asu.zoom.us/j/89629062319>