

MICROPLATE DESIGN FOR REACTION SYSTEMS INVOLVING IMMOBILIZED ENZYME/BACTERIA

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ABSTRACT

Microwell plate also known as microplates are common in the fields of diagnostic medical and biotechnology with applications ranging from tissue culture to specific enzymatic assays. The design of the microplates with up to 96 wells allows what was conducted in test tubes to be scaled-down and multiplied, drastically increasing the number of samples to be tested while lowering the cost of processing them. Despite the miniturization, typical laboratory procedures such as shaking, filtering, separating and centrifugal spin are still possible. Furthermore, the cheap and disposable nature of microplates is revolutionary. Advancement in material sciences also contributed to the development of various types of microplates, with properties such as biologically and chemically inert, supporting adherent cell growth and superior heat resistance. Here we aim to design microplate suitable for reaction systems involving immobilized enzyme or bacteria. Enzymes and bacteria immobilized in solid matrices can interfere or obstruct the light path for detection when reading with microplate readers. An innovative design is proposed to prevent this problem and ensure superior optical clarity for accurate detection for various assays even when colored or opaque matrices are utilised for immobilization. This will allow greater flexibility for researchers to design micro-assays using solid opaque matrices without losing the compatibility to microplate readers.

Keywords: chemical reaction, immobilized enzyme, microplate design

INTRODUCTION

Designs and innovations to various products evolve into more functional with increased usability and added value. More often, innovations are driven by the needs to solve problems faced by users in using the previous versions of the product. Scientific approaches are often utilized to improve the production of materials, improve usability and durability and add features to ease the use of products.

However, in the heart of science, in the world of chemistry and biology, innovations of tools used to study these characteristics of nature are usually slower than the progress of these disciplines. An obvious example in chemistry is the usage of glass test tubes. Even though chemistry have benefitted mankind by advancing to the realm of nanotechnology, scientists still rely on the glass test tubes, basically the same design and material used since the beginning of science. Nevertheless, not every single tool and devices in science have stayed the same. The advancements in the optical technology have contributed greatly to many discoveries leading to development of many technologies.