**CONCEPT CLEARANCE RECORD**

**FY 2016 RESEARCH INITIATIVE – NCATS**

TITLE: Development of SmartPlate Technology

INITIATIVE TYPE: SBIR contract proposal to be included in the U.S. Public Health Service's 2016 Omnibus Contract Solicitation, to be released in October 2015

OBJECTIVE(S): A key goal tied to this technology is to break the idea of a plate being completely disposable and instead treating each plate as a resource that can be used many times.

DESCRIPTION: Instead of limiting these plates to only being a variety of plastics with a lifespan of one use, if different materials and manufacturing techniques were utilized, it could greatly affect the purpose(s) for which a plate could be used. Imagine the plate as a multilayer circuit for example; it could be possible for a variety of monitor and control applications to be built directly into the plate, such as temperature, relative humidity and $CO_2$ and $O_2$ levels, instead of relying on external pieces of instrumentation to perform these measurements.

IMPORTANCE: The term "smartplate" was adopted to imply a similar flexibility to the technology and multiple applications of the smartphone; once a platform was built to create a phone that could perform a variety of functions, as opposed to simply one, a huge amount of innovative ideas sprang forth. The key goal of this Small Business Innovation Research (SBIR) solicitation is to do the same: to fundamentally transform the idea of a microtiter plate from being a single-use vessel for an experiment to nearly becoming an instrument that could provide more data about the samples under test to actually providing measurements in the plate itself.

HISTORY: One nearly universal parameter, regardless of plate type, is that these plates typically are assumed to be a consumable product, used once and then discarded, making them, in effect, disposable. Given the consumable nature of the product and the materials used to manufacture them on a large scale at low cost, the features that distinguish one plate from another typically come down to the physical properties of the materials of which the plates are made and any additional additives, potentially limiting the plate from being anything more than a vessel for an experiment.

Another key aspect of this topic is the growing need for a variety of research areas to have a more robust platform for which experiments are performed. For tissue chip researchers, a growing area of need is for more complex and capable microfluidic devices and/or platforms for which experiments will take place. Instead of simply being a passive fluidic system, there is growing need for the ability to potentially have fluidic valves and reaction chambers while at the same time integrating the ability to have inline sensors provide feedback such as flow, temperature and pH. For tissue-printing researchers, there is the realization that, instead of printing into passive trans-well plates, more complex active plates with microfluidics and sensors along the same lines as used in tissue chip applications might also be necessary in order to promote the cells deposited to behave in a particular fashion. Both of these areas of research are reaching a common inflection point, in that the current state-of-the-art technology with regard to plates and materials is proving to be limited and a leap forward in capabilities might act to enable each to overcome current limitations.

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