

Morgridge/UW-Madison

# Biomedical Engineering Seminar Series

presents

## Dr Shana Kelley

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### SEMINAR

Mon. May 1st, 2023 | 12:00 PM – 1:00 PM

Tong Auditorium 1003 Engineering Centers Building  
1550 Engineering Dr, Madison, WI

### ***“High-throughput cell profiling for therapeutic discovery and development”***

Over the last five years, an explosion in the number of single-cell measurement methods has occurred. However, most of these methods are applicable to pure populations of cultured cells and are not able to handle high levels of heterogeneity or a large background of non-target cells. Furthermore, the measurement of protein expression at the single cell level has remained a challenge given that amplification strategies used for nucleic acids sequences cannot be employed. Our laboratory has developed a new analytical strategy to meet this unmet need referred to as magnetic ranking cytometry (MagRC). Cells expressing a biomarker of interest are labeled with receptor-coated magnetic nanoparticles and isolated from nontarget cells using a microfluidic device. The device ranks the cells according to the level of bound magnetic nanoparticles, which corresponds to the expression level of a target biomarker. This approach is amenable to multimodal analysis of both RNAs and proteins in single cells – a capability that is missing in most single-cell assays. Through continuous evolution, two generations of MagRC devices have been developed for different applications. The first-generation MagRC devices are powerful tools for the quantitation of rare cells present in heterogeneous samples, such as CTCs, stem cells, and pathogenic bacteria. The second-generation MagRC devices are compatible with recovery of cells sorted on the basis of protein expression and can be used to analyze large populations of cells and perform phenotypic CRISPR screens to discover new therapeutic targets. Both generations of MagRC devices permit the isolation of viable cells, which sets the stage for a wide range of applications including cell therapy development.



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