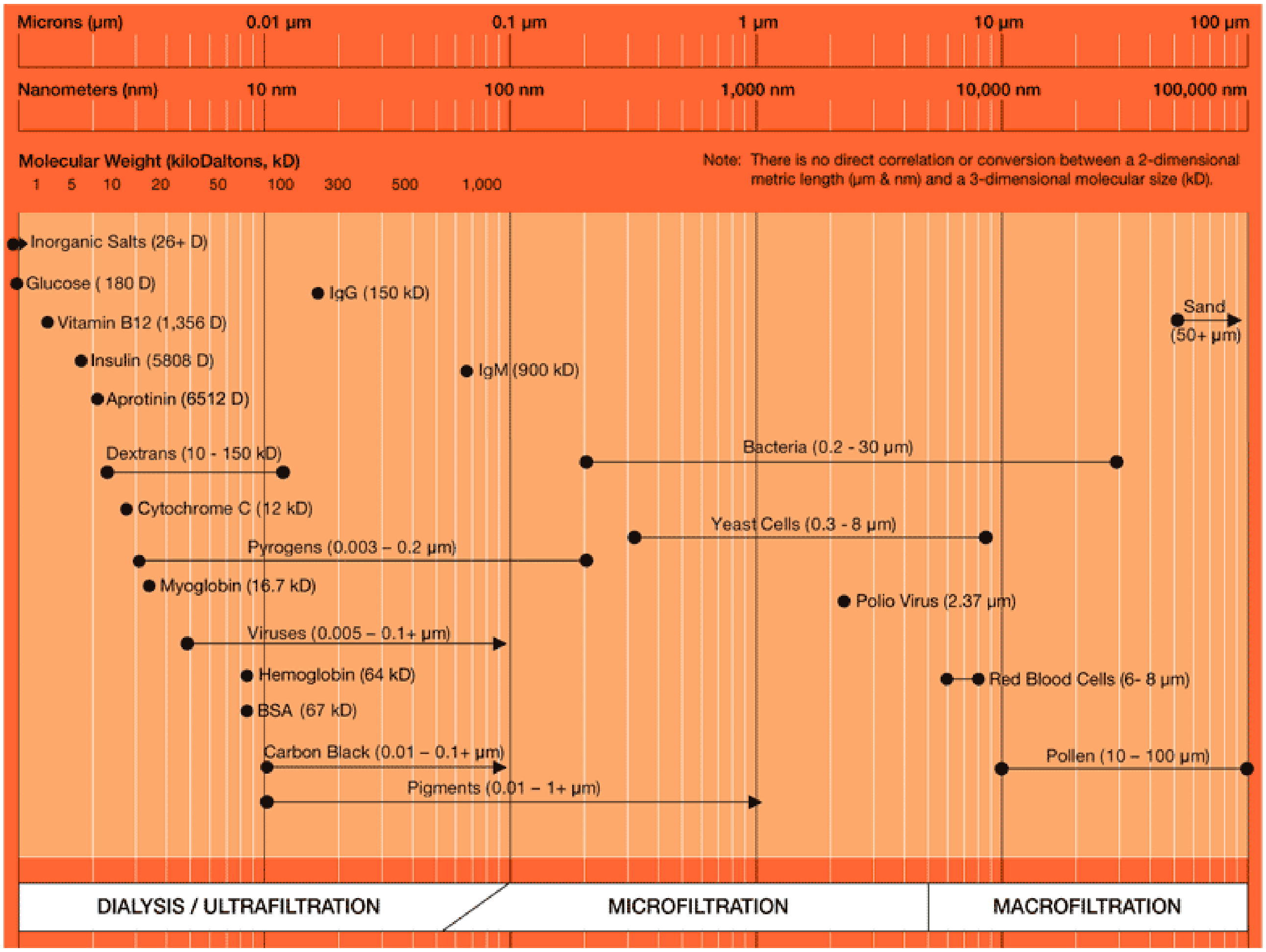
Research Directions of the Duke Acoustofluidics Group (2019-2023)



1. **Improvement of our current technology:** Can we manipulate particles < 100 nm (*e.g.*, viruses and other nanoparticles shown in the picture above)?
2. **Improvement of our current technology:** Can we improve the resolution (*e.g.*, from 1-10 µm to 100 nm) and precision (*e.g.*, separate 100 nm particles from 110 nm particles) of acoustic manipulation by implementing new concepts (*e.g.*, acoustic metamaterials and metasurfaces) into acoustofluidics?
3. **Improvement of our current technology:** Can we make our acoustofluidic technologies more practical (*e.g.*, higher throughput, no sheath flows needed, and disposable chips)?
4. **Applications of our current technology:** Can we collaborate with biologists and use our acoustofluidic technologies to address real-world, important problems in biology and medicine?
5. **Applications of our current technology:** Can we integrate our acoustofluidic technologies with on-chip sensing technologies to enable real microTAS?
6. **Out-of-box:** Can we expand the capabilities of our acoustofluidic technologies? Our recent work on digital acoustofluidics (*Nature Communications,* Vol. 9, 2928, 2018) is a perfect example.
7. **Very Out-of-box:** Can we use acoustics and micro/nano engineering to work on topics that impact biology and medicine but are beyond acoustofluidics? Can we do something in areas that we have not done before? For example, can we do acoustic-based *in vivo* manipulation, therapy, and delivery (see *Nature Methods, Vol.* **15**, pp. 1021–1028 (2018))?