1. **Could you give a brief overview of the topics covered in your review?**

This review navigates the landscape of microfluidic methodologies transforming the fabrication of lipid-based nanoparticles for advanced drug delivery. We discuss innovative liposome synthesis methods, as well as cutting-edge microfluidic strategies for generating extracellular vesicles and their mimetics, using extrusion and surface engineering approaches. At the core is the awareness that microfluidic technologies could significantly contribute to the field of precision medicine by enhancing therapeutic outcomes.

1. **Why did you decide to write this review? Why is this topic ready for a review at this time?**

This review should provide a comprehensive insight into the disruptive potential of microfluidic technologies in the manufacturing of lipid-based nanoparticles. The increasing demand for more efficient and tailored drug delivery strategies and the concomitant progresses in microfluidic technologies, urged us to present and discuss potential developments for the advancement of precision medicine.

1. **What advantages to lipid-based nanoparticles have over other drug delivery methods?**

Lipid-based nanoparticles, such as liposomes and extracellular vesicles, stand out due to their unique advantages over traditional drug delivery methods. They exhibit remarkable biocompatibility and can encapsulate a wide array of therapeutic agents, representing a versatile platform for targeted and controlled release. Their ability to mimic natural cell membranes and transport different cargoes enhances their efficacy, further marking their competitive advantage in the drug delivery landscape.

1. **Why are lipid nanoparticles challenging to manufacture? How have microfluidics helped to overcome these obstacles?**

The main challenges in manufacturing of lipid nanoparticles are batch-to-batch variability and scale-up difficulties. Microfluidics could be a game-changer by offering unparalleled control over production processes where nanoparticles can be precisely engineered, maintaining uniformity and reproducibility. This technology's ability to streamline and optimize the manufacturing of lipid-based nanoparticles holds immense promise in addressing these long-standing challenges.

1. **What would you highlight as the most promising advance or advances covered in your review?**

We believe that the most disrupting advancement centers on microfluidics' transformative role in engineering extracellular vesicles (EVs) and EV mimetics. By leveraging microfluidic platforms, researchers can fine-tune the properties of EVs, enhancing their potential as drug delivery carriers. Moreover, the integration of large-scale production techniques furthers microfluidics' applicability, leading to a paradigm shift in drug delivery strategies and bolstering the prospects of precision medicine.

1. **What excites you about the future of this field? What potential developments are you most excited about?**

Microfluidics has been around since the early 1980s, but it’s still a developing field.. what’s more exciting than that? Its application and possible impact on personalized drug delivery is one of these recent developments, and the design possibilities, increased targeting precision, and minimized adverse effects promise a paradigm shift in patient care. Coupling microscale technologies with the principles of personalized medicine offers an intriguing vision on how to reshape therapeutic approaches on a wide range of clinical scenarios.