**Assessment of your knowledge**

(a) Answer the following questions to assess your command on terminology, facts, concepts, and theories learned in this chapter:

1. What is MEMS?
2. Can you recall one to two applications enabled by MEMS technology in your daily life?
3. What is the purpose of a cleanroom?
4. What is the volume range that microfluidic system aims to control?
5. What is μTAS?
6. What is PDMS?
7. Can you recall the four steps of the general sequence for obtaining micropatterned PDMS?
8. Explain the etymological meaning of "photolithography".
9. What is a photomask?
10. How to use photomask to generate patterns on a thin film made of photoresist (PR)?
11. What is the difference between positive and negative PRs?
12. Explain the concept of soft lithography. How is soft lithography related to photolithography?
13. What is the dominant flow regime in microfluidic systems?
14. Explain microcontact printing technique and how the technique can be used to pattern cells.
15. What is tissue micromolding?
16. Explain the advantages of microtissues.
17. How can microbeads/droplets be formed using T-junction channels?
18. What is the configuration of flow-focusing channels?
19. Recall two to three typical types of physical interactions that are useful for self-assembly of microtissues.
20. Explain the role of sacrificial material in the templated molding of microtissues.

(b) Answer the following questions to assess your ability to apply the concepts and theories learned in this chapter in real life, clinical, and scientific situations.

1. Since most of the photoresist reacts to UV lights, what is the preferred setup for room lights for performing photolithography? Is there any possible strategy to perform photolithography without the worry of unwanted photo cross-linking under daylight?
2. For traditional monolayer culture of anchorage-dependent cells using cell culture dishes/flasks, the liquid level is strictly controlled to be lower than ca. 1e2 mm to ensure sufficient oxygen delivery from ambient environment to the cells. Think about the case of culturing cells in enclosed microchannels, what are the possible strategies to deliver oxygen to the cells? (Hint: think about how human body tackles this issue; check the oxygen permeability of various materials such as silicon, glass, PDMS, etc.)
3. Following the previous question. Think about strategies to deliver sufficient nutrients and oxygen to the cells in the large tissue constructs assembled using the point-, line-, plane-shaped microtissues.
4. Learn the concept of Reynolds number in fluidics. Calculate the Reynolds number of the microfluidic channel.
5. What is the advantage of the laminar flow regime to pattern biomaterials? Is it possible to generate chaotic flow in microfluidic systems and how?
6. Think about a sequence of experiment in your own project, can it be fulfilled in a one-stop fashion using μTAS? (Hint: check out the microfluidic cell sorting machines as an example)
7. Is it possible to increase the throughput of biological assays using microfluidic systems and how?
8. How can microfabricated electrodes be used for tissue engineering purposes?
9. Conceive a strategy to build a textile machine to weave line-shaped microtissues.
10. Can the microfluidic methods for the fabrication of point-shaped microtissues also be used to fabricate artificial cells? If so, how could these artificial cells be used for tissue engineering and regenerative medicine?
11. Consider how to engineer perfusable lumen structures using microfabrication techniques, and how the angio/vascular-genetic ability of endothelial cells such as human umbilical vein endothelial cells (HUVECs) could be combined with microfabricated channels to create perfusable vasculature networks.