Depth Gradient of RGD for SMCs Migration

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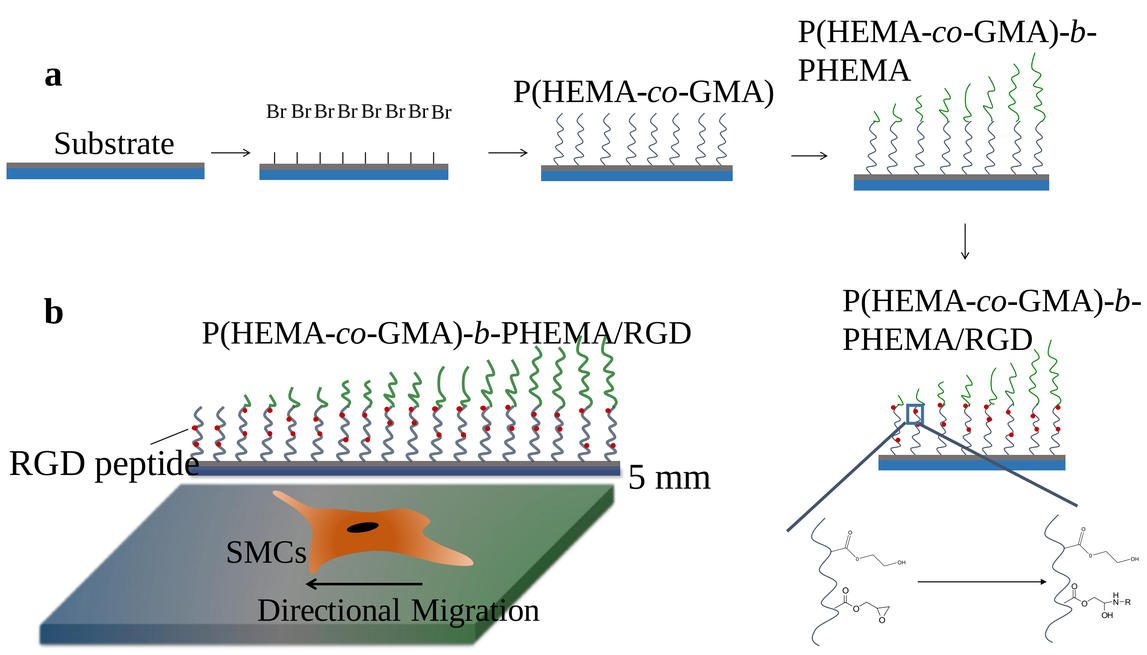
Introduction: The property of interface and surface is the core issue in the study of biological materials. Substrate surfaces with biochemical cues are not only important for tissue regeneration, but also provide guidance to understand the basic principles dictating surface-cell interplay. In this work, substrates that differ in the 3D presentation of the RGD peptide can be obtained by SI-ATRP method. Then the gradient surfaces with RGD depth are used to study cell adhesion and directional migration.



Scheme 1. **a** Schematic illustration to show the fabrication of the depth gradient of RGD peptides, whose depth is controlled by the polymerization time of the second block. **b** Schematic illustration to show the structure of a depth gradient of RGD peptide and its influence on the mobility of smooth muscle cells (SMCs).

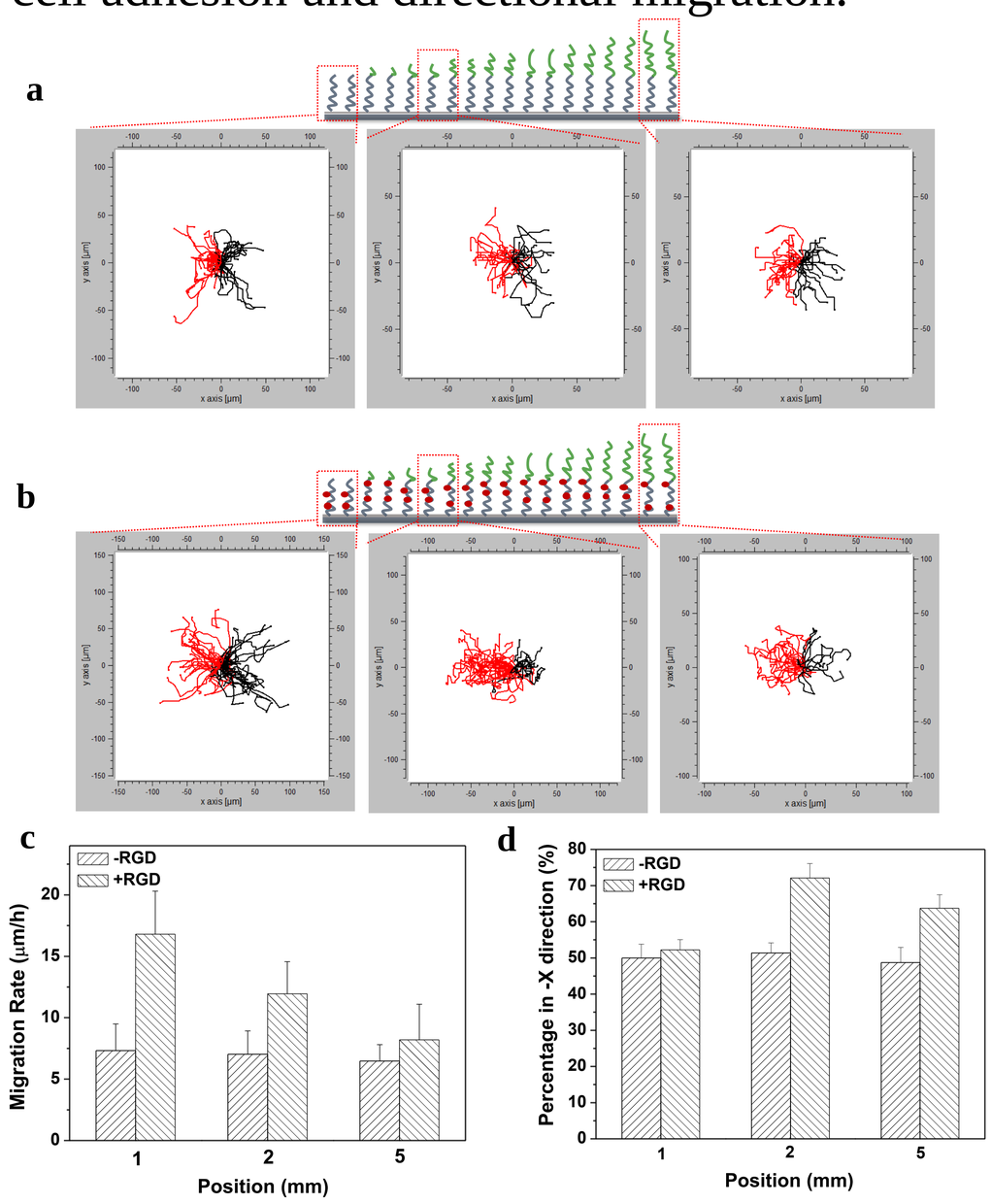


Figure 2. Migration traces of SMCs on depth gradient surface **a** without and **b** with RGD. **c** Migration rate and **d** cell percentage in –X direction of SMCs on gradient surfaces.

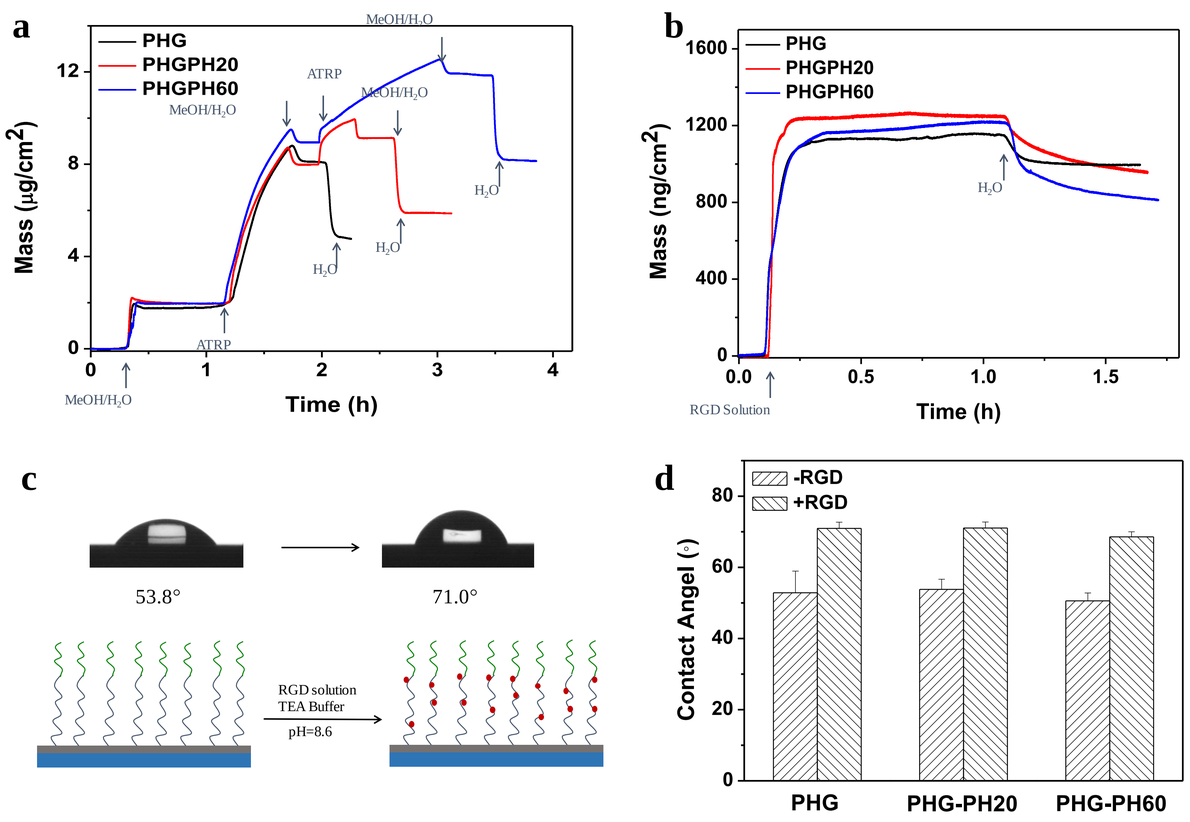


Figure 1. QCM-D monitored **a** the in situ ATRP of HEMA/GMA copolymers and HEMA homopolymers, **b** the immobilization RGD peptide on the samples. **c, d** Water contact angle of polymer surfaces before and after immobilizing RGD peptide.

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Conclusions: A 3D localization depth gradient of cell adhesive RGD peptide was successfully fabricated. When the RGD peptide presented at a distance up to 39 nm from the substrate surface, the surface did not support cell adhesion, resulting in a rather slower mobility. The SMCs exhibited directional migration behaviors toward gradient direction (shorter distance of RGD from the surface) with an enhanced migration rate.

References

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