Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

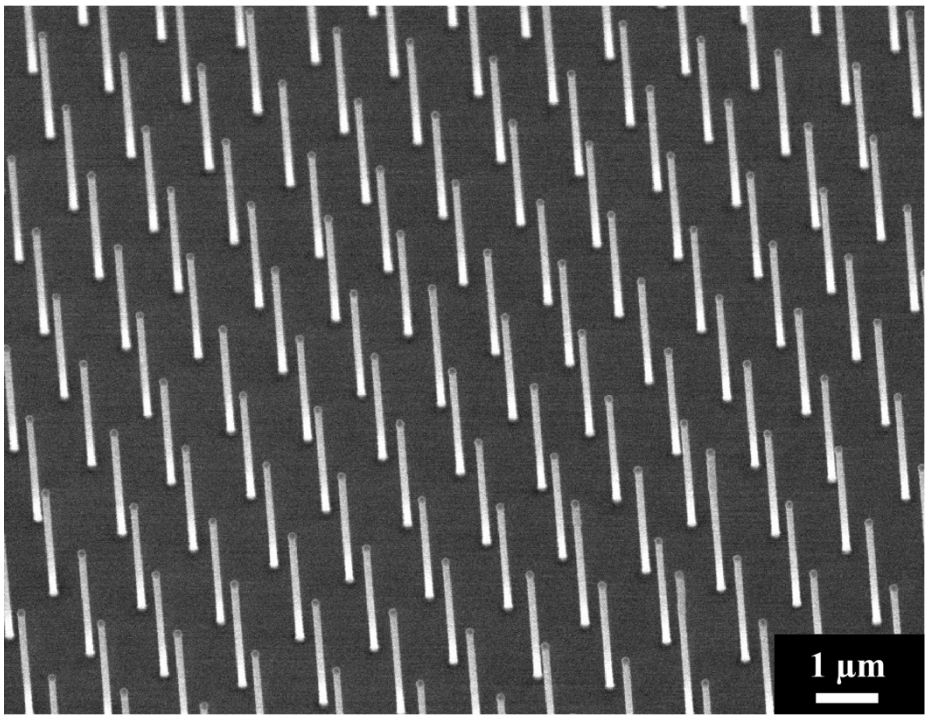


Fig. S1 Scanning electron microscopy image of GaP nanowire arrays. Tilt 30°.

Fig. S2 A representative video of JIMT-1 cells cultured on glass and imaged using digital holographic microscopy with images every 5th minute for a total time of 48 hours. The video shows the 10 first images, 10 images from 24 hours of imaging, and last the 10 last images of the time-lapse.

Fig. S3 A representative video of JIMT-1 cells cultured on flat GaP and imaged using digital holographic microscopy with images every 5th minute for a total time of 48 hours. The video shows the 10 first images, 10 images from 24 hours of imaging, and last the 10 last images of the time-lapse.

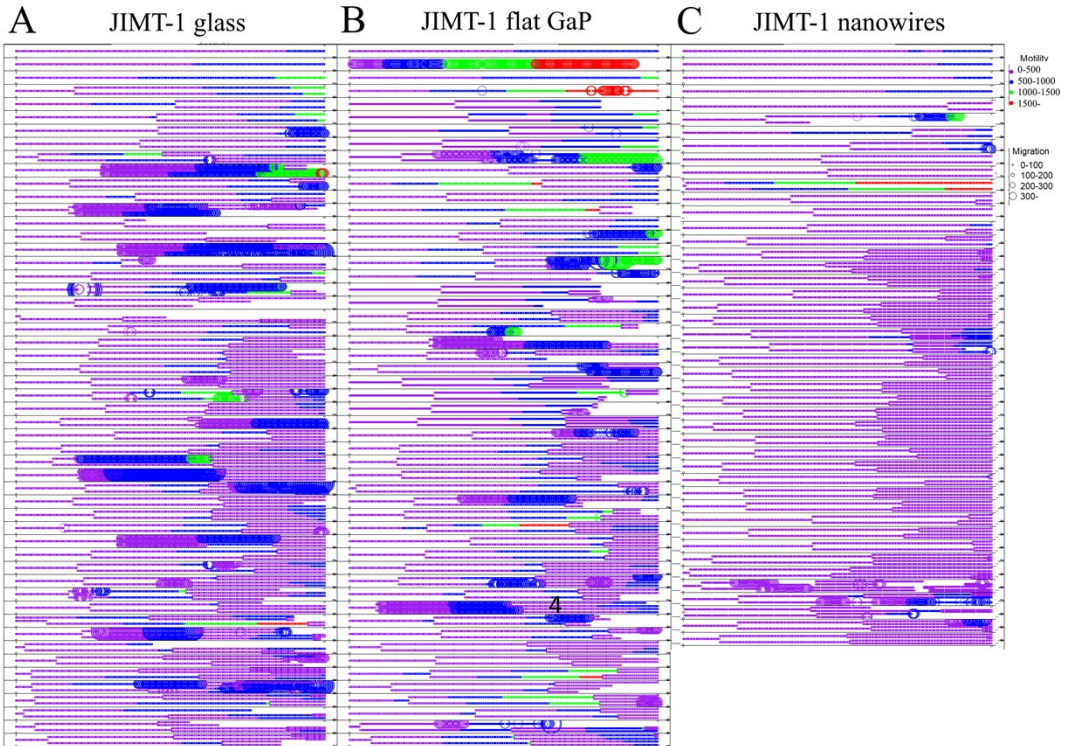
Fig. S4 A representative video of JIMT-1 cells cultured on an array of GaP nanowires and imaged using digital holographic microscopy with images every 5th minute for a total time of 48 hours. The video shows the 10 first images, 10 images from 24 hours of imaging, and last the 10 last images of the time-lapse.

Fig. S5 A representative video of MCF10A cells cultured on glass and imaged using digital holographic microscopy with images every 5th minute for a total time of 48 hours. The video shows the 10 first images, 10 images from 24 hours of imaging, and last the 10 last images of the time-lapse.

Fig. S6 A representative video of MCF10A cells cultured on flat GaP and imaged using digital holographic microscopy with images every 5th minute for a total time of 48 hours. The video shows the 10 first images, 10 images from 24 hours of imaging, and last the 10 last images of the time-lapse.

Fig. S7 A representative video of MCF10A cells cultured on an array of GaP nanowires and imaged using digital holographic microscopy with images every 5th minute for a total time of 48 hours. The video shows the 10 first images, 10 images from 24 hours of imaging, and last the 10 last images of the time-lapse.

Fig. S8 JIMT-1 cells cultured on glass (**A**), flat GaP (**B**), or nanowires (**C**) were imaged by digital holographic microscopy every 5th min for 48 h. Cells were tracked using HStudio™ and cell family trees, motility, and migration data were extracted. The image consists of cell families where at least one branch could be tracked for the entire time-lapse. The color shows the motility and the size of the symbols shows migration. During the time-lapse, motility constantly increases, while migration can increase or decrease depending on how the cell is moving in comparison to its original position. For each substrate, six time-lapses were analysed. Motility and migration data are compiled in Figure S10. The number of trees that full-fill the requirement of 48 h tracking is dependent on the tendency for cells to migrate out of the imaging frame and the number of cells in the very first image of the time-lapse, i.e. the attachment of the cells.



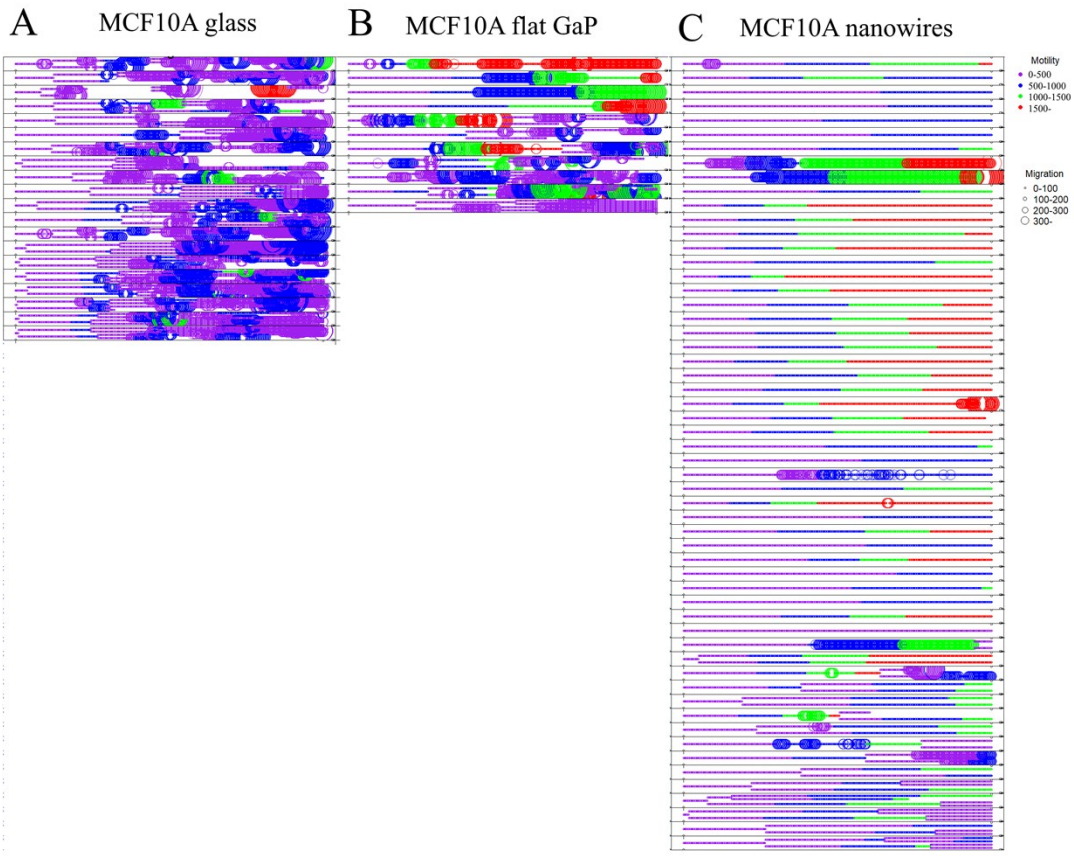


Fig. S9 MCF10A cells cultured on glass (**A**), flat GaP (**B**), or nanowires (**C**) were imaged by digital holographic microscopy every 5th min for 48 h. Cells were tracked using HStudio™ and cell family trees, motility, and migration data were extracted. The image consists of cell families where at least one branch could be tracked for the entire time-lapse. The colour shows the motility and the size of the symbols shows the migration. During the time-lapse, motility constantly increases, while migration can increase or decrease depending on how the cell is moving in comparison to its original position. For each substrate, six time-lapses were analysed. Motility and migration data are compiled in Figure S10. The number of trees that full-fill the requirement of 48 h tracking is dependent on the tendency for cells to migrate out of the imaging frame and the number of cells in the very first image of the time-lapse, i.e. the attachment of the cells. The figure shows that more MCF10A cells seeded on glass and flat GaP move out of the imaging frame than MCF10A cells seeded on nanowires.

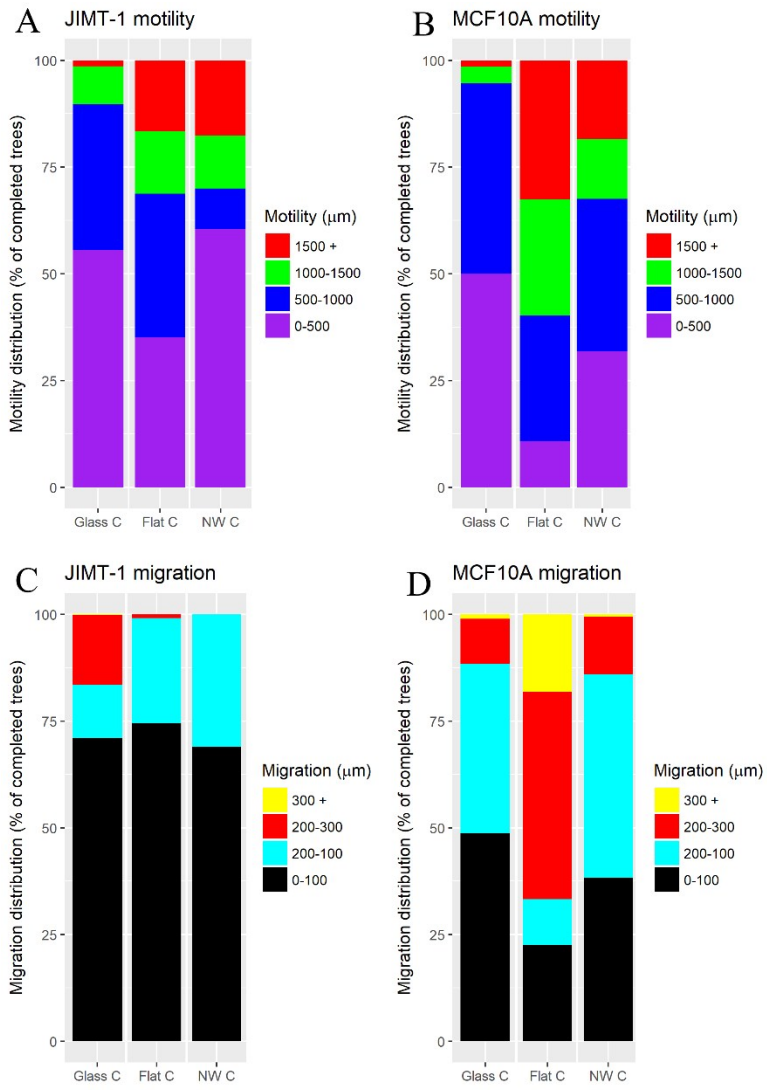


Fig. S10 A compilation of motility (**A** and **B**) and migration (**C** and **D**) data acquired from the cell trees of JIMT-1 cells (Fig. S2) and MCF10A (Fig. S3). During the time-lapse, motility constantly increases, while migration can increase or decrease depending on how the cell is moving in comparison to its original position. Comparing JIMT-1 cells seeded on glass and on flat GaP reveals that motility is higher on flat GaP than on glass, while migration is lowered on the former (**A** and **C**). When cells were seeded on nanowires, motility decreased while migration is un-changed compared to flat GaP. Motility was higher for MCF10A cells seeded on flat GaP and nanowires, than for cells seeded on glass (**B**). Migration was highest for MCF10A cells seeded on flat GaP. DFMO treatment resulted in increased motility and migration of cells seeded on glass and nanowires while cells seeded on flat Gap were less affected (**F** and **D**).

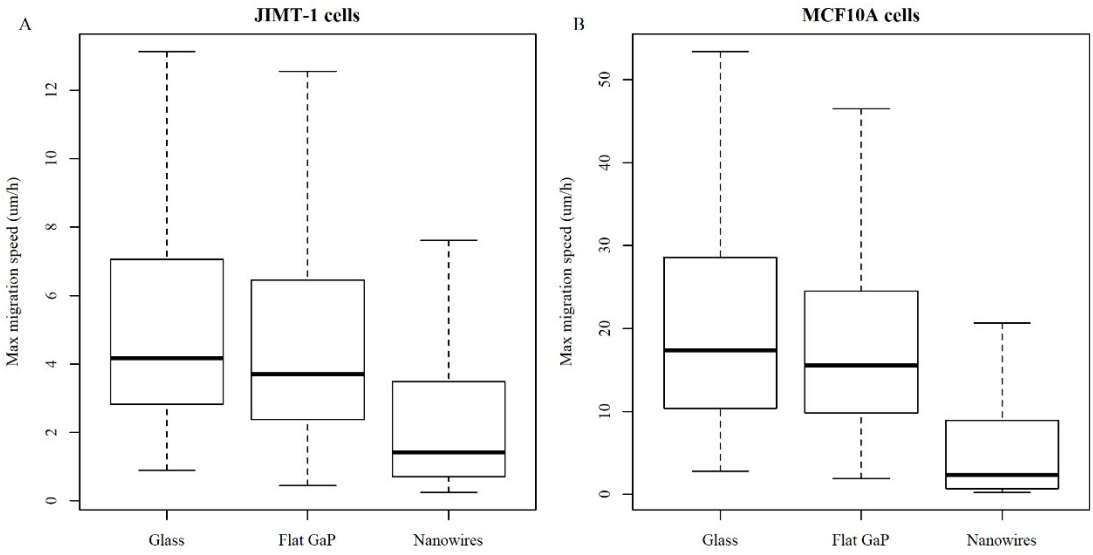


Fig. S11 Max migration speed on the various substrates.
Max migration for all JIMT-1 and MCF10A cells during a 48 h time-lapse of cells seeded on glass, flat GaP, or nanowire substrates. Please observe the different y-axis in A and B.