Use of Laser Scanning Cytometry for Analysis of Endothelial Cells Attached to Micropatterned Silicon Surfaces

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The development of microdevices with biomedical applications relies on the understanding of cell behavior at bioinorganic interfaces. Micropatterning of these surfaces for controlled cell attachment is known to strongly influence cellular physiology. However, an integrated platform for the analysis of the correlation between the physiological status of the living cells and their topographical parameters on a micron scale has not been available to date. Here, we suggest that laser scanning cytometry (LSC), a newly developed solid-state flow cytometry-like technology, offers an attractive solution. We also provide the proof of concept for its application in the analysis of endothelial cells grown in micron-width bands on the surface of silicon wafers. We used LSC analysis to compare the growth of endothelial cells on line patterned and nonpatterned areas, in terms of several nuclear morphological parameters. Our data support the conclusion that lateral confinement of endothelial cell attachment induces a quiescent state, possibly by inhibiting their ability to proliferate.