

## Reemergence of the microworld

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Recent advent in microscopy has enabled us to zoom-in on the fine structure of cells and molecules, opening the nano world. But, at the same time, increasing attention has also been paid to the knowledge that we can get by zooming-out the image, bringing us back to the microworld. This trend has been emerging because researchers have noticed significant heterogeneity in cell population and the importance of cell-to-cell communication in many fields of biology. We are developing genetically-encoded biosensors based on Förster resonance energy transfer (FRET) to visualize the activities of cellular signaling molecules, such as small GTPases and protein kinases. We have found significant heterogeneity in the activities of signaling molecules not only in live tissues but also even in single cell-cloned cell populations. Such heterogeneity is found to be generated by various mechanisms such as stochastic activation or cell-to-cell communication. I will introduce the FRET biosensors briefly and present our recent findings obtained by the use of the FRET biosensors.