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Sommario/riassunto	Development of new imaging technologies in recent years has transformed neuroscience in profound ways. Following on the heels of the revolution based on the Green Fluorescent Protein, refined genetically-encoded fluorescent reporters and genetic targeting strategies now enable optical recording of synaptic transmission in defined neuronal populations at speeds approaching the enviable temporal resolution of electrophysiology. Super-resolution light microscopy permits observation of synapses and their molecular machinery at sub-diffraction resolution. At the ultrastructural level, automated forms of electron microscopy, improvements in specimen fixation methods, and recent efforts to correlate data from light and electron micrographs now make the reconstruction of functional neural circuits a reality. Finally, the use of optogenetic actuators, such as channelrhodopsins, allows precise temporal and spatial manipulation of neuronal activity and is revealing profound insights into the organization of neural circuits and their roles in behavior. This research topic highlights recent advances in both light and electron microscopy, with a specific focus on approaches that combine innovations from several different fields to obtain novel information about synapse structure and function. We are confident that this collection of articles - three original research papers, six reviews, one methods paper and one perspective article - will enable neuroscientists to achieve the next generation of experiments aimed at cracking the neural code.