Instructed-assembly (iAssembly or iA) refers to the formation of ordered superstructures of molecules as the consequence of at least one trigger event (e.g., a reaction or a ligand-receptor interaction). As a biomimetic process that generates supramolecular assemblies, iA has emerged as a powerful approach to provide spatiotemporal control for a range of potential biomedical applications, including molecular imaging, cancer therapy, and tissue engineering. This talk introduces the general concept of iA in the context of cells and illustrates how to achieve iA for applications. By mainly describing the representative examples of iA and its applications in complex environment, such as cells or animals, and providing the perspectives of the future development of iA, I will show that, as a process that bridges self-assembly and self-organization, iA offers chemists a facile means to explore the emergent properties of molecular assemblies and the dynamics of molecular processes to control cell fate.