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One of the great challenges in the postgenome era is to clarify the biological significance of intracellular molecules in living cells. If we could provide new chemical tools that enable us to visualize or manipulate a molecule in action, it would be possible to acquire biological information that is unavailable with existing biochemical technologies. One possible approach is to design and synthesize chemical tools that can convert biological information into chemical reactions that are easily monitored. For this purpose, newly designed chemical tools have been developed and successfully applied to living cells. Several approaches for chemical biology research will be introduced in this mini symposium by young investigators.