The origin of life on Earth remains one of the most tantalizing scientific questions of all time. In this talk I will describe recent advances in a relatively new area of chemistry, systems chemistry, which attempts to uncover the physical–chemical principles underlying that remarkable transformation. A significant development has been the discovery that within the space of chemical potentiality there exists a largely unexplored kinetic domain, dynamic kinetic chemistry. That discovery has opened new doors toward the preparation of active materials with biological-like functionality, as well as offering new insights into the origin of life process. The path toward the chemical synthesis of rudimentary proto-life systems may finally be opening up.