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People have long been fascinated by the elegance with which nature is able to self-assemble small parts into complex structures. Chemists have long mimicked these processes to realize synthetic macromolecules. In the field of electronics however, the advances have been slow. The fabrication of discrete functional building blocks, let alone integration thereof, is seen as a historical challenge. Here we demonstrate for the first time that self-assembly can be used to make organic integrated circuits. We employed a bottom-up approach. Semiconducting molecules were designed that have a tendency to aggregate and functionalized with an anchor group to attach to a template. By submerging the template into a solution containing the molecules, a densely packed monolayer is self-assembled. Over 300 of those self assembled transistors were combined into integrated circuits. This demonstration paves the way to fabricate organic electronics using the ultimate production technology namely self assembly.