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Multiplex selection and elution of aptamers using nanoporous sol-gel droplets and a microheater array SEUNG-MIN PARK, Cornell University, JIYOUNG AHN, MINJOUNG JO, SOYOUN KIM, Dongguk University, DONG-KI LEE, Sungkyunkwan University, JOHN LIS, PANGSHUN ZHU, HAROLD CRAIGHEAD, Cornell University — Aptamers are well-known protein capture reagents that bind to specific proteins and can be effective in inhibiting the protein's normal interactions. Here, we have described a process for selective binding and elution of aptimers from the nanoporous silicate sol-gel droplets within which target proteins are immobilized. These silicate sol-gel droplets are incorporated with polydimethylsiloxane (PDMS) microfluidic systems and individually addressable by electrical microheaters. These properties allow discrete protein – nucleic acids interaction so that multiplexed selection is possible. It is shown that specific aptamers bind their respective protein targets and can be selectively eluted by micro-heating. Our microfluidic in vitro selection system improves selection efficiency, reducing the number of selection cycles needed to produce high affinity aptamers. We are also able to separate high-affinity nucleic acid species from a large random nucleic acid pool. The process is readily scalable to larger arrays of sol-gel-embedded proteins.

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