Setup of a desiccator chamber

To form a closed chamber for aerosolizing DNA and viral solutions, a vacuum desiccator (VL, AS ONE) was modified (Figure S1). Through-holes for the tubing were drilled into the desiccator body, and a valve seat (3309, AS ONE) was fixed with screws and connected to the silicone tubing. The modified desiccator was equipped with three ports: (i) an air supply port for the nebulizer to introduce aerosols into the chamber, (ii) a suction port connected to a microfluidic chip for aerosol capture, and (iii) a pressure-balancing port to stabilize the internal pressure.

A nebulizer (NE-C803, Omron) was used to atomize the solution at 0.2 mL min^{-1}, producing aerosols with a nominal particle diameter of 3 µm. The generated aerosols were captured using a microfluidic channel chip placed in the chamber. The chip outlet was connected in series to a high-efficiency particulate air (HEPA) filter, a drying-bead moisture trap, mass-flow controller, and vacuum pump. By regulating the suction flow with the mass flow controller, constant airflow was maintained through the microfluidic chip. Aerosols not captured by the chip were removed by the downstream HEPA filter, and moisture that could adversely affect the pump was removed using drying beads. To accommodate the potential imbalance between the supply and exhaust flows, the pressure-balancing port on the top of the chamber was fitted with a HEPA filter, allowing HEPA-filtered make-up air to enter under negative pressure and allowing air to exhaust under positive pressure.

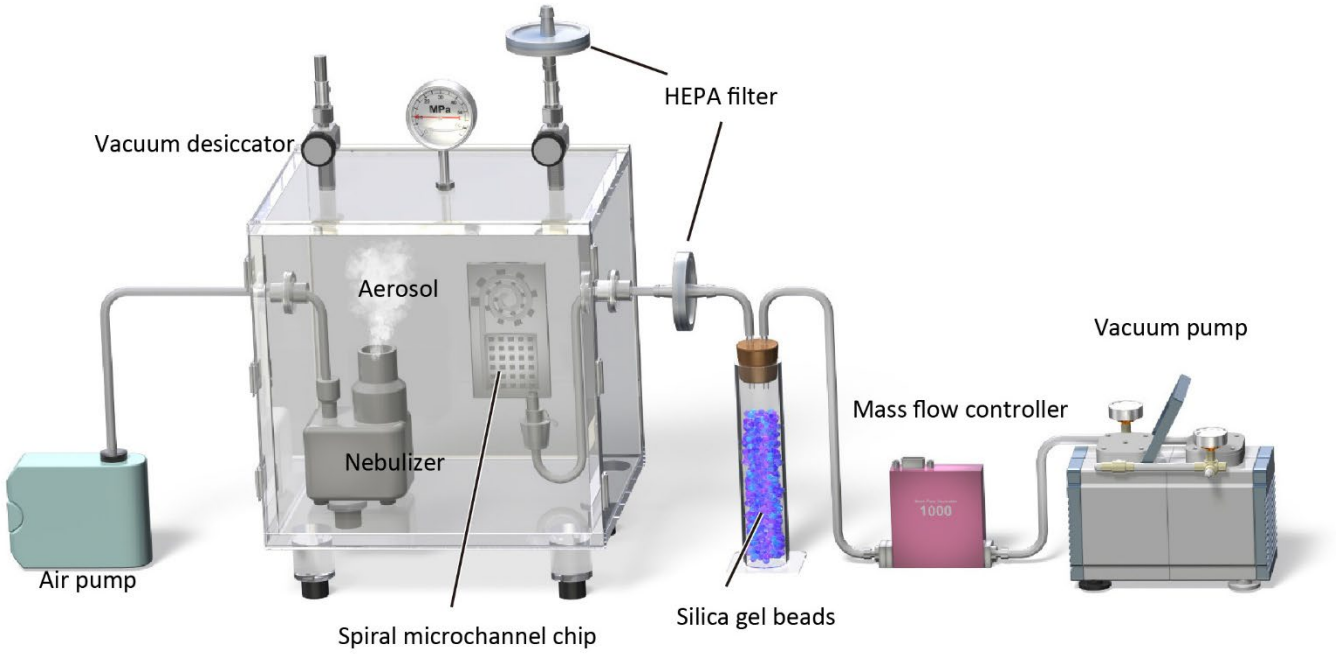


Figure S1. Schematic of the desiccator system for aerosol generation and capture.
A vacuum desiccator modified to serve as a closed spray chamber. A nebulizer introduces aerosol into the chamber, and a microfluidic chip captures the aerosol under controlled suction. The chip outlet is connected to a HEPA filter to remove uncaptured aerosols, a drying-bead trap to remove moisture, a mass flow controller to set the suction flow rate, and a vacuum pump. A HEPA-filtered pressure-balancing vent is installed on the chamber to compensate for pressure fluctuations.