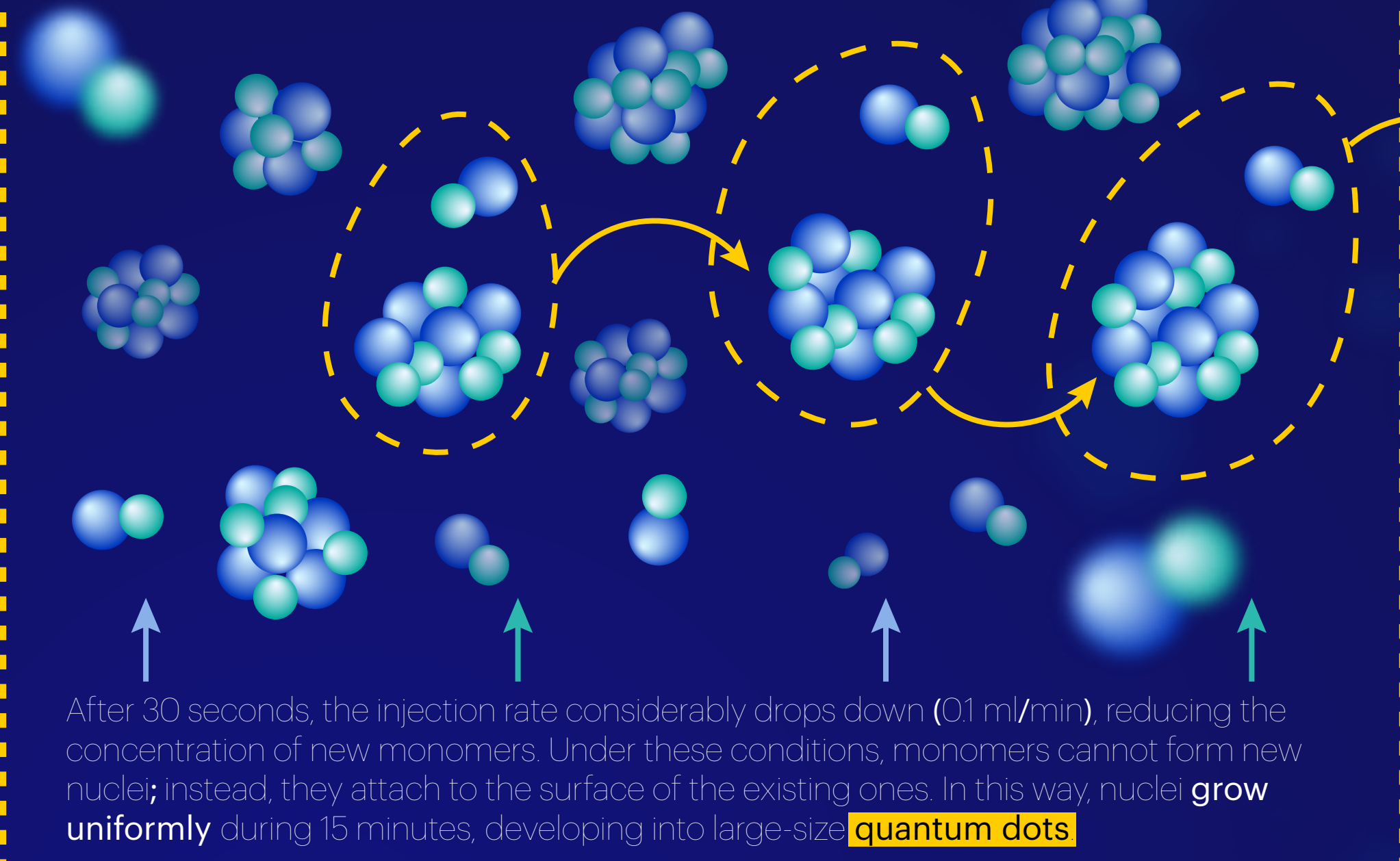
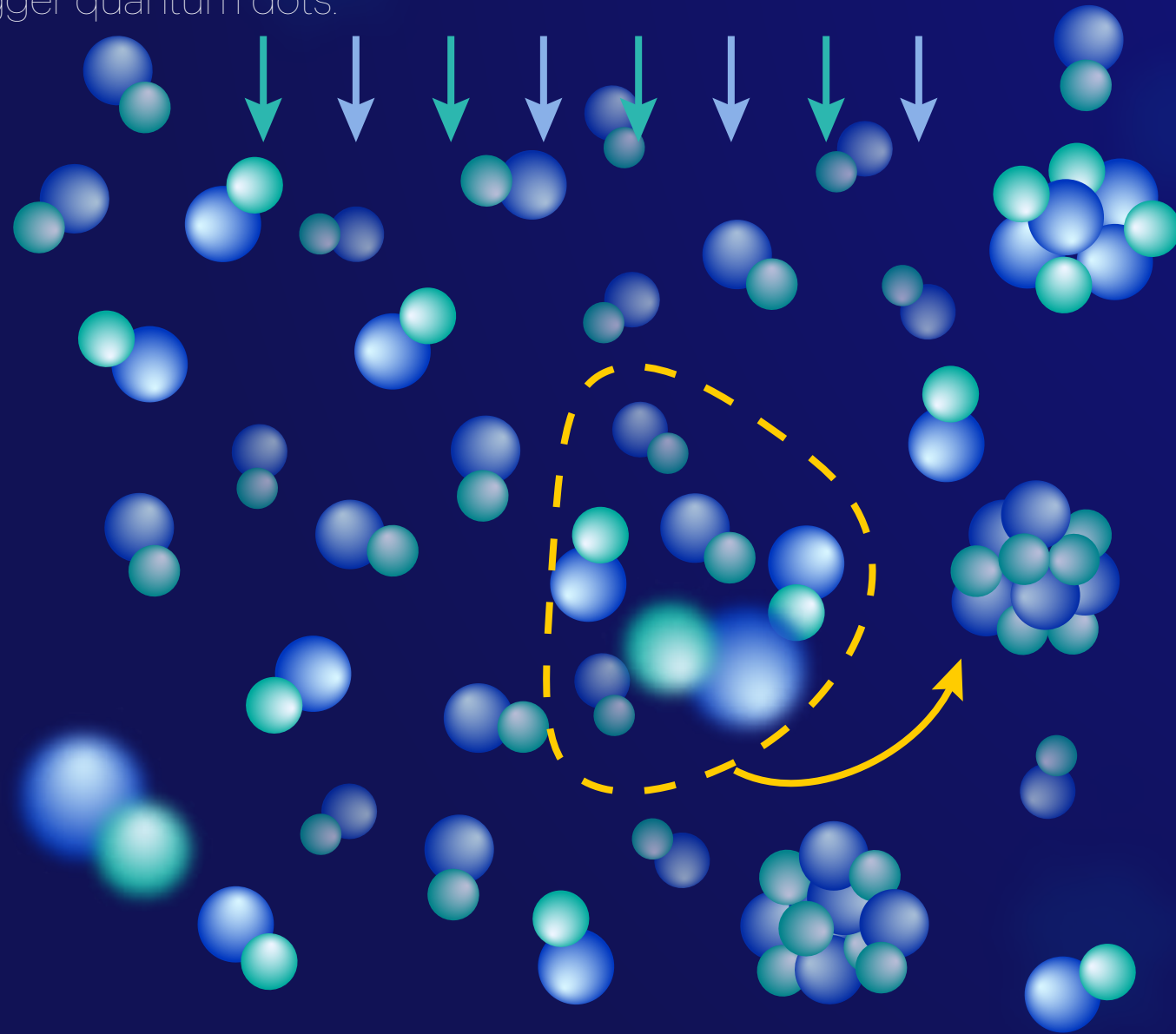


1 Nucleation: Fast injection

Two **precursors** (InCl_3 and $\text{Sb}[\text{NMe}_2]_3$) are injected rapidly (1 ml/min) into the system. When mixed, they react to form many InSb molecules called **monomers**. Once monomer concentration is high enough (saturated solution), they spontaneously cluster together to produce **InSb nuclei**. These are the seeds that will then grow into bigger quantum dots.

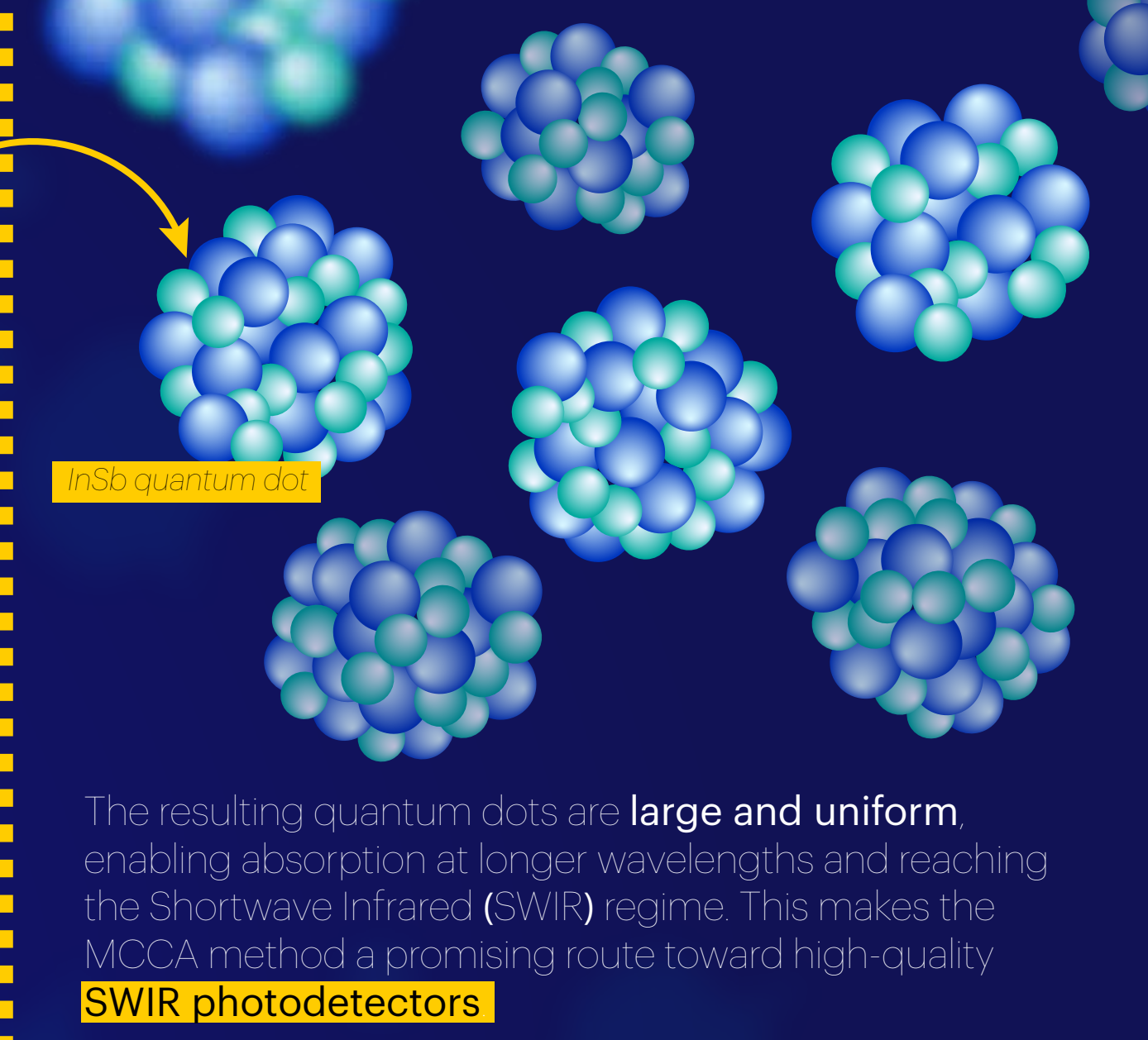
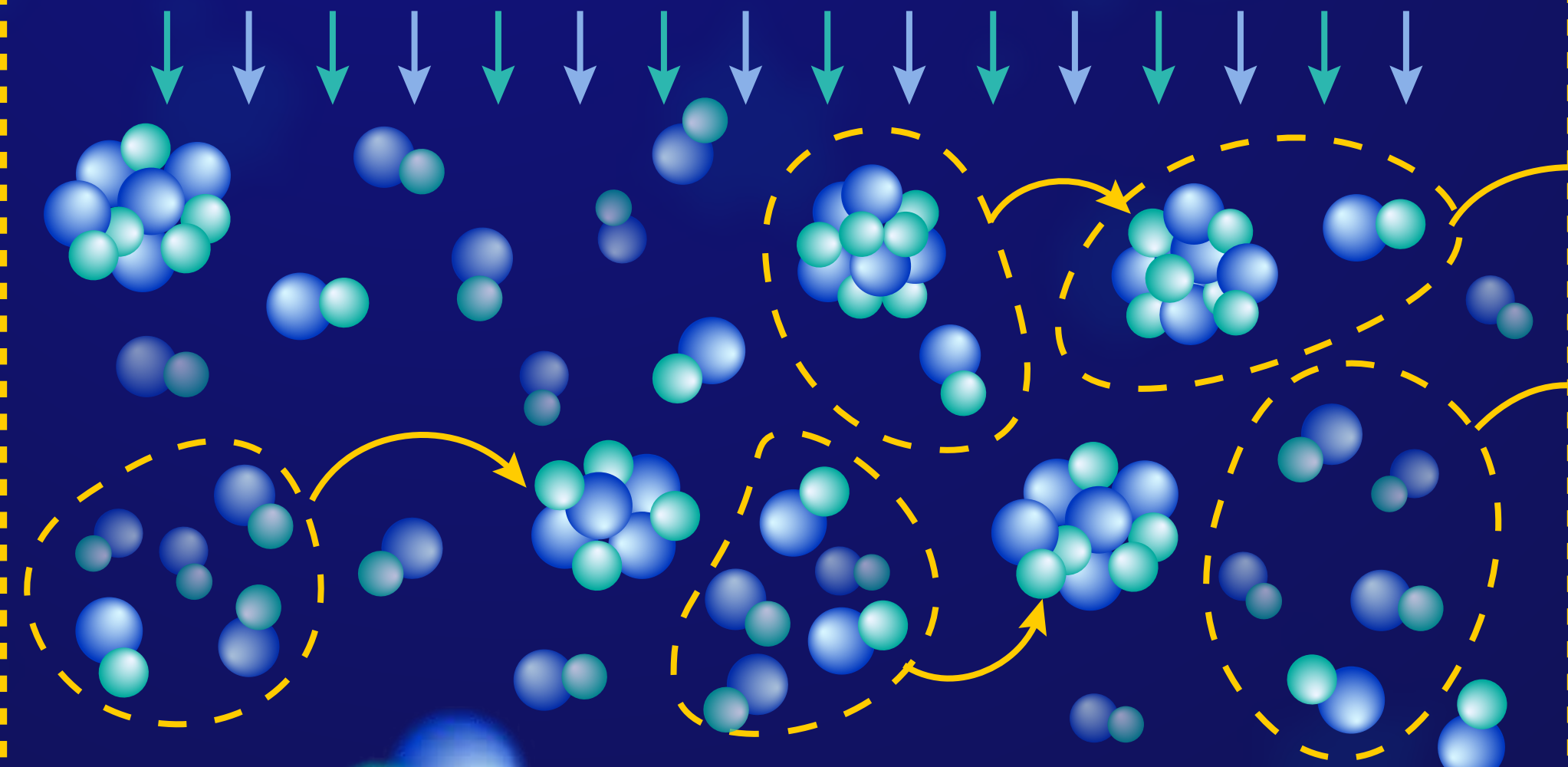


2 Growth: Slow injection

After 30 seconds, the injection rate considerably drops down (0.1 ml/min), reducing the concentration of new monomers. Under these conditions, monomers cannot form new nuclei; instead, they attach to the surface of the existing ones. In this way, nuclei **grow uniformly** during 15 minutes, developing into large-size **quantum dots**.

2 Growth: Fast injection

Continued precursor injection at a constant high rate generates an excess of monomers. The majority form new InSb nuclei, while the remainder incorporate onto existing ones, driving their growth. Consequently, newly formed nuclei have less time to grow than older ones, which generally results in a broad size distribution.



The resulting quantum dots are **large and uniform**, enabling absorption at longer wavelengths and reaching the Shortwave Infrared (SWIR) regime. This makes the MCCA method a promising route toward high-quality **SWIR photodetectors**.

3 New results

3 Traditional results

The resulting quantum dots have **variable sizes** that are **generally smaller** than those produced by the MCCA. Consequently, their absorption spans a broader wavelength range but does not extend into the SWIR regime.

