

Miniature Stick-packaging

Pre-storage and Release of Reagents in Lab-on-a-Chip Systems

On-chip liquid reagent pre-storage is often required in mobile analytical and diagnostic systems. Hahn-Schickard offers a novel approach for reagent pre-storage in tubular-shaped composite foil pouches, called stick-packs (Fig. 1). The technology allows packaging a combination of liquid and dry reagents.

Release mechanism

An integrated frangible seal enables the pressure-controlled release of reagents and simplifies the layout of lab-on-a-chip (LOAC) systems, thereby making the package a functional microfluidic release unit. The frangible seal is adjusted to defined burst pressures ranging from 20 to 140 kPa. When inserted into a centrifugal microfluidic LOAC platform, the frangible seal delaminates by centrifugal forces at a defined burst frequency (Fig. 2, Fig. 3).

One-/two-chamber stick-packs

Stick-packs featuring one chamber are for the pre-storage and release of liquid reagents ranging from 50-1200 μl . Since smaller amounts can't be released independently, liquids or solids ranging from 1-50 μl / mg are packaged in the second chamber of two-chamber stick-packs. This allows the release of



Fig. 1: Miniaturized stick-packs for combined storage and release of dry and liquid reagents

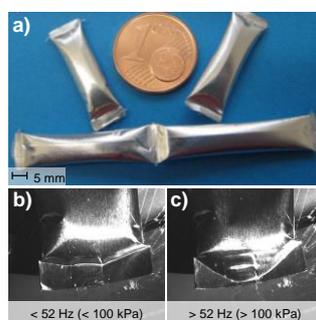


Fig. 2: Miniaturized stick-packs. (a) frangible seal before, and (b) during release of liquid reagents upon centrifugation

both reagents by delamination of the center and outer frangible seal subsequently.

Attributes

Stick-packs have been successfully tested applying recovery tests, in which $99 \pm 1\%$ of 250 μl pre-stored liquid is released. Long-term storage tests indicat-

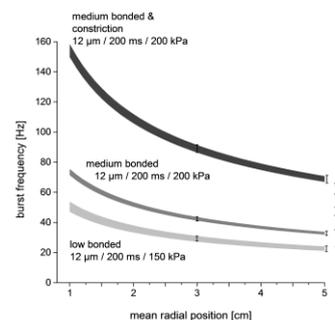


Fig. 3: Burst frequencies in a centrifuge at variable radial positions. The marked areas correspond to standard deviations.

ed a loss of only $< 0.5\%$ for simulated 2 years storage. Air transport simulation tests were also conducted successfully. In conclusion, the developed technology enables the long-term storage and on-demand release of liquids or combinations of liquid and dry reagents.