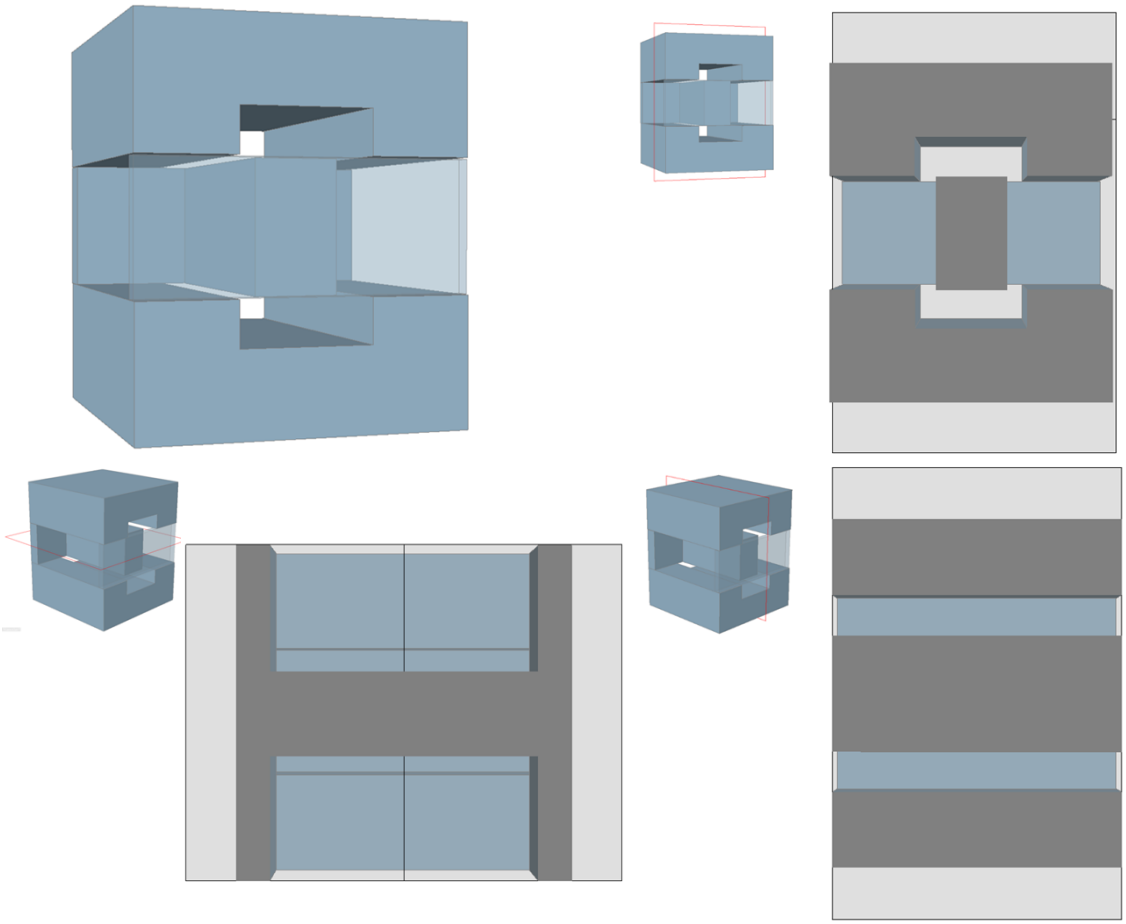
Electronic Supplementary Material (ESI) for Lab on a Chip.

Supplementary Information

Figure SI.1 Illustration of the PMMA floating waveguides.



SI.2 Electronic circuit design and fabrication

Electronic circuit design and fabrication is based on a simplification of a lock-in amplifier where information is at the level of the modulus of the received signal and the phase is ruled out. This configuration allowed for simplification of electronic circuit requirements and important reduction of size and cost. Electronic circuit is used to control both LED and photo-detector for optical interrogation of the sample and subtraction of ambient light interference (e.g. sun, external light sources, etc.). Briefly, a frequency generator provided the signal to the LED, which flowed across the environment to measure (ETM) and was finally received by the photo-detector. A 8 kHz emission pattern was selected, in this case, for being orders of magnitude higher than interfering light sources, such as home light (50, 60 Hz) or sunlight. A band-pass filter in the source, with a narrow frequencies window between 6 and 10 kHz, eliminated interfering signals. Additionally, a lowpass filter, with a cutoff frequency of 29 Hz, removed high harmonic components from the detector. Low frequency components, which determine the evolution of the measurement, were amplified to be acquired for an analog-to-digital converter (ADC). Buffering and biasing elements were also incorporated in the electronic circuit respectively to adapt the signal to subsequent stages or to improve emission/reception performance. Arduino platform (Arduino nano, Smart Projects, Italy) was used to develop the electronic system for being simple, cheap, robust and versatile. This platform had two main functions, that is the generation of the 8 kHz signal pattern and the conversion of analog signal from lock-in amplifier to digital to be transmitted to the CPU where it was acquired and post-processed (when necessary).

Figure SI.3 Optical setup for alginate characterization.

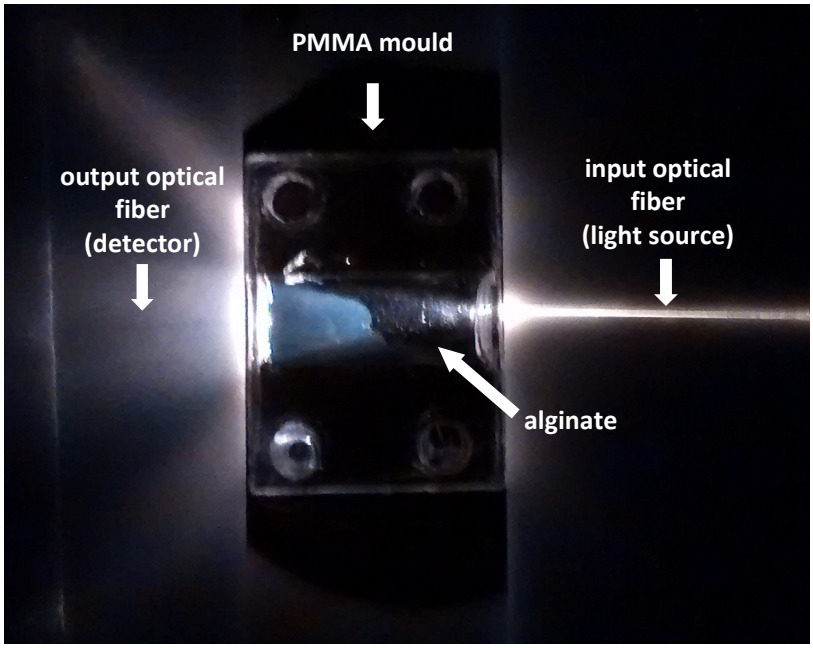


Figure SI.4 Absorbance spectra of catechol and 2-HMS.

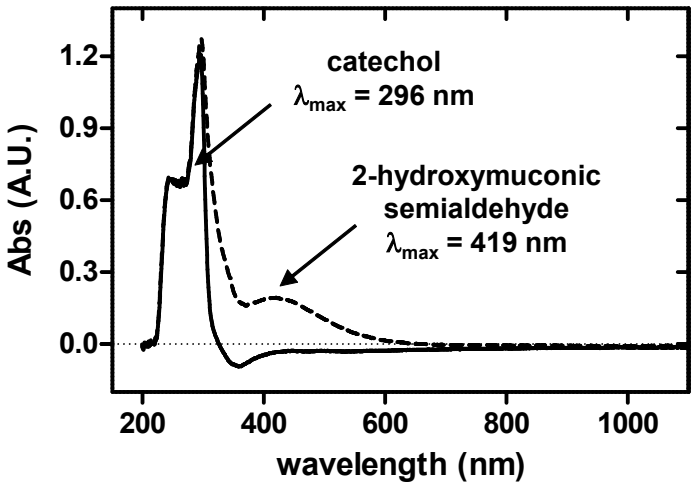


Figure SI.5 Degradation kinetics of several catechol concentrations for 1x10^7 CFU/mL *E. coli* suspensions.

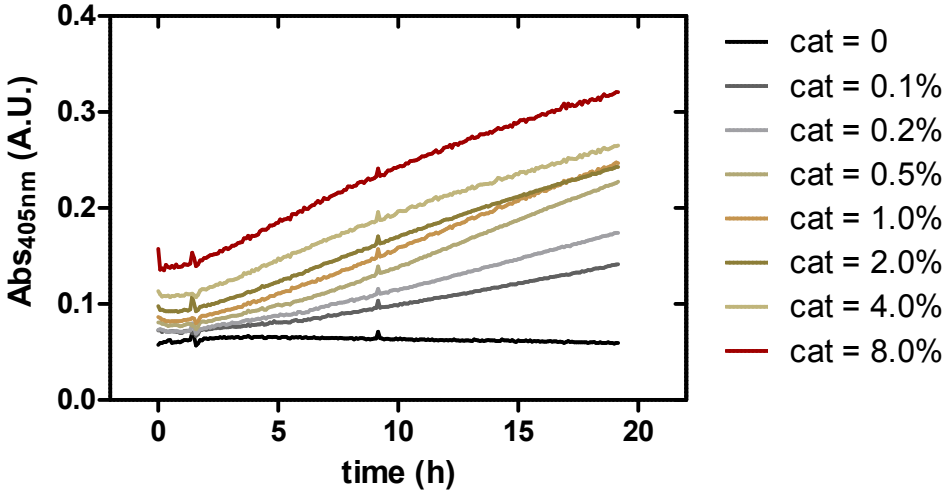


Figure SI.6 Evaluation of the LED stability. Variation of the LED intensity with time.