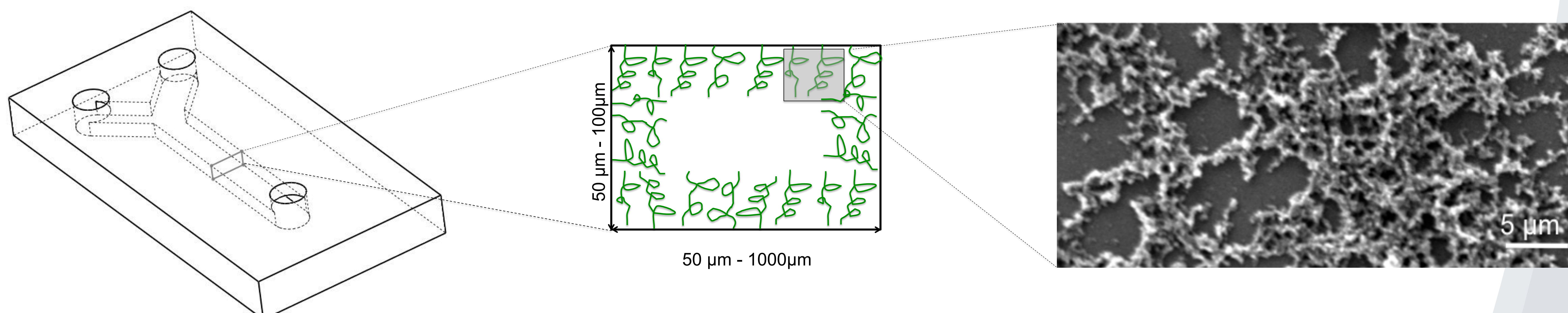
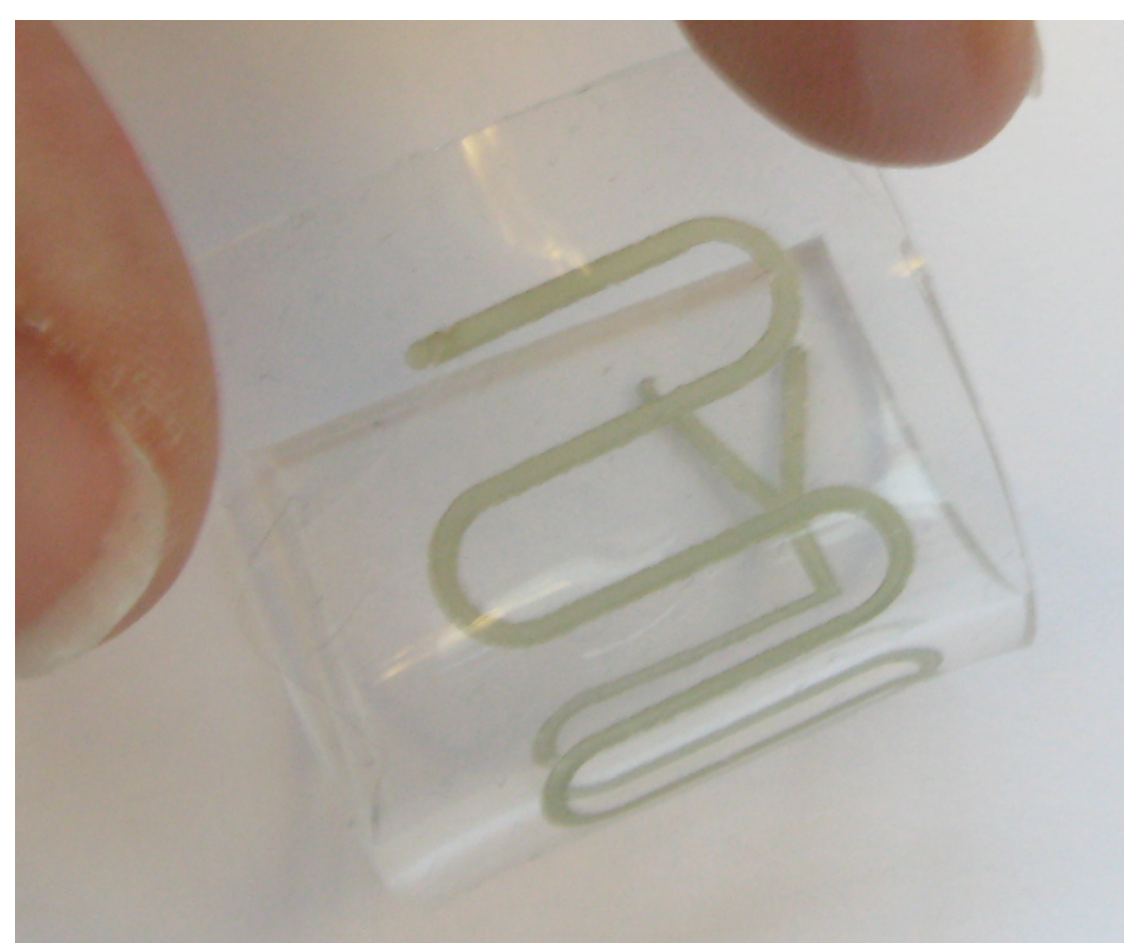


Larisa Florea, Fernando Benito-Lopez, Emer Lahiff and Dermot Diamond

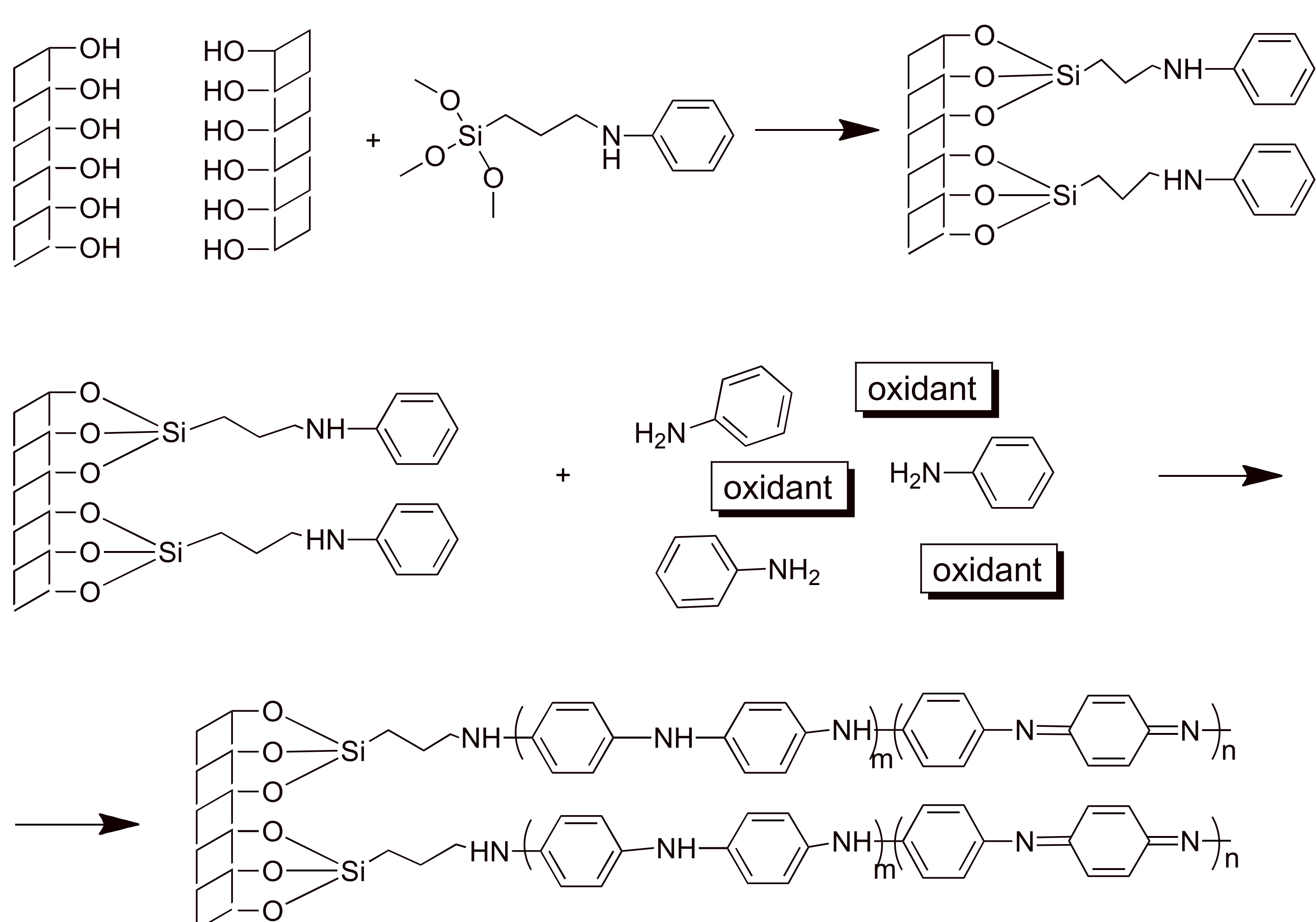
CLARITY: The Centre for Sensor Web Technologies, National Centre for Sensor Research, School of Chemical Sciences, Dublin City University, Dublin 9, Ireland;

➤ Introduction

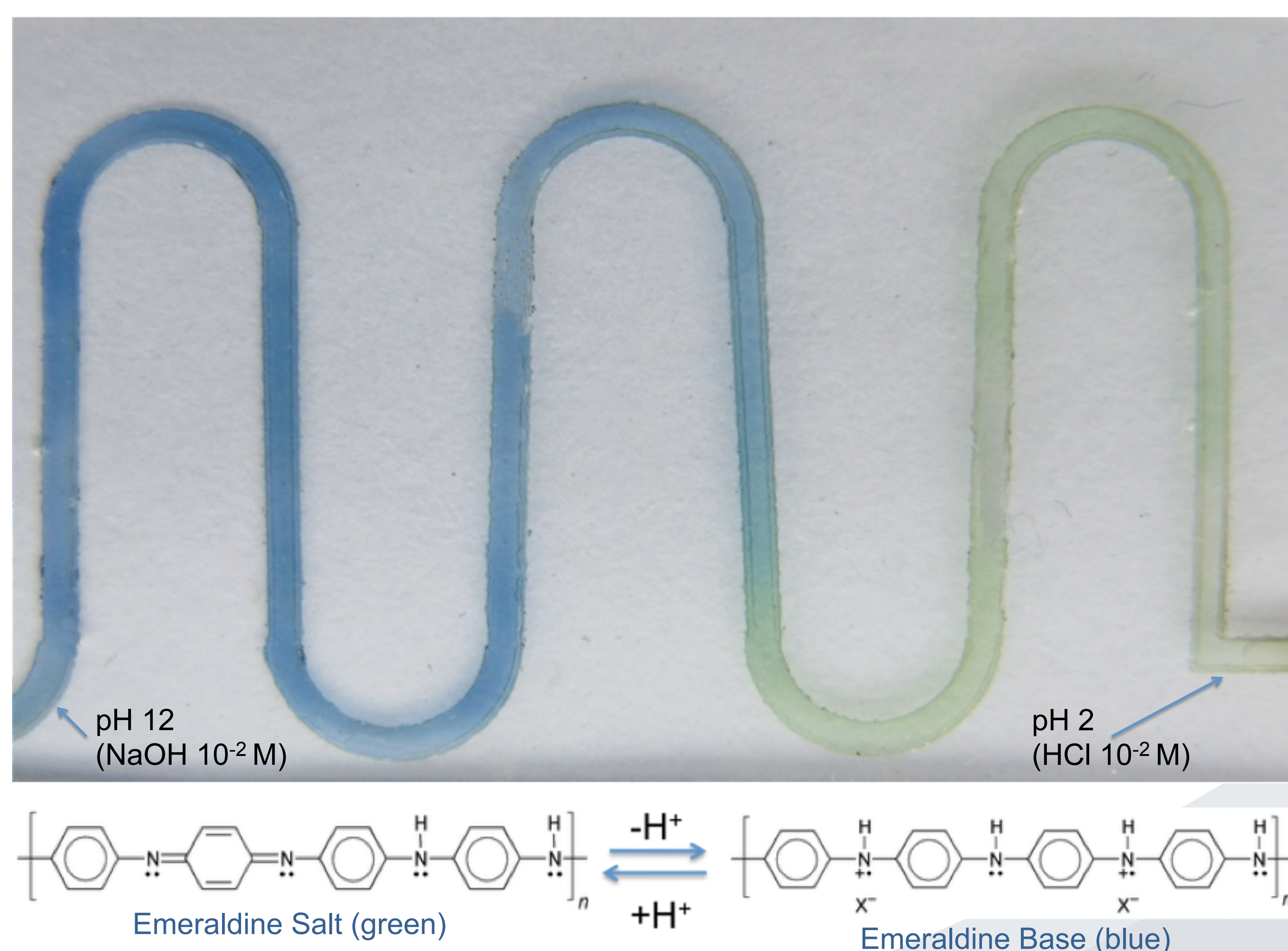
Polymer brushes based on the conducting polymer polyaniline were synthesized on the interior of micro-capillaries and micro-fluidic channels to study the influence of these brushes on solvent flow through a confined space. The polyaniline brushes are formed using a “grafting from” approach [1]. The optical/electrical properties of these polyaniline coatings change in response to the pH of the solution that is flushed inside the micro-channel. These unique properties offer a new route of characterising liquid transport in micro-fluidic devices and holds promise as a means for developing integrated micro-fluidic optical sensors.



➤ Micro-channel Functionalisation Process



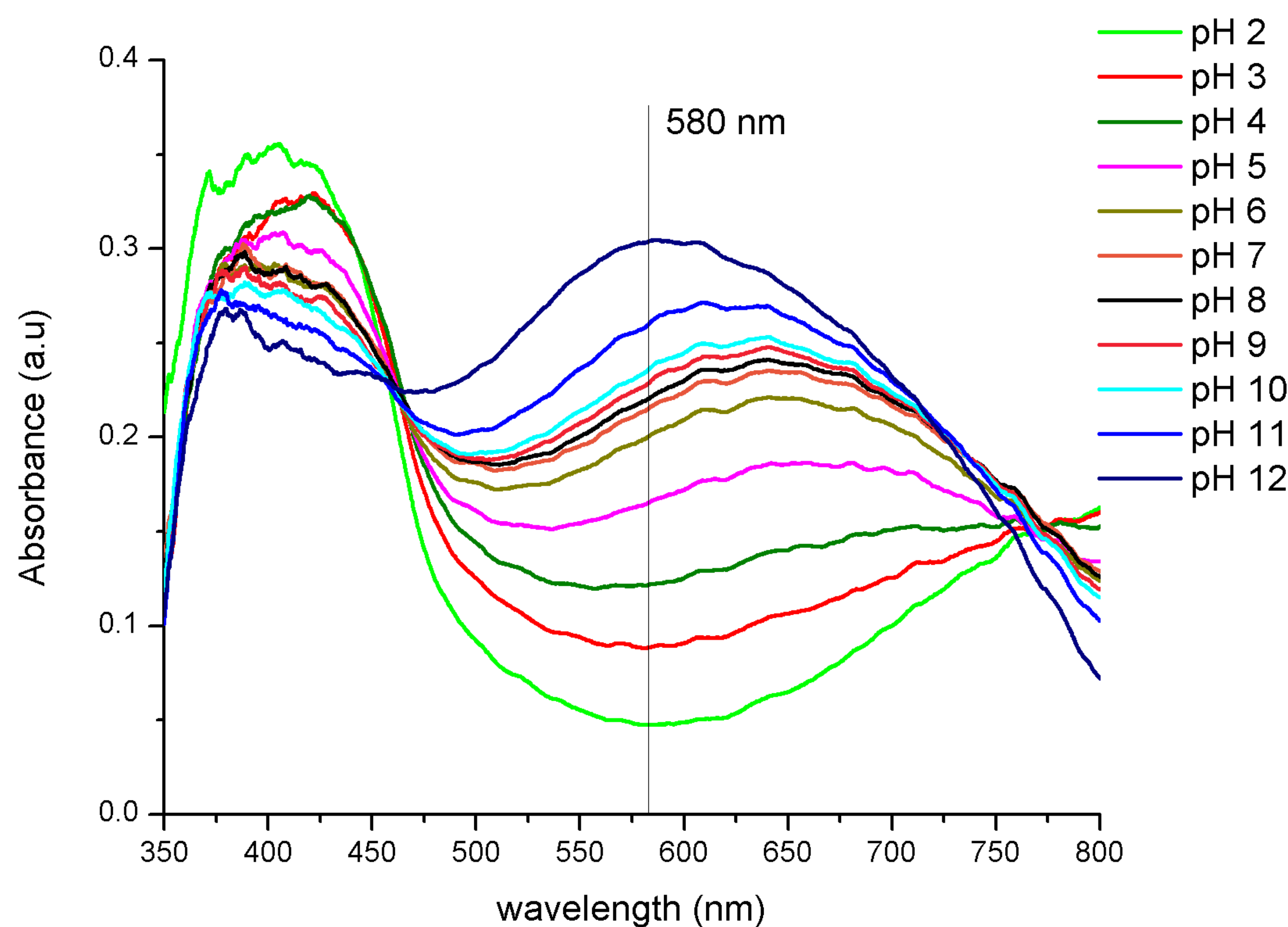
➤ Sensing pH gradient



The polyaniline coatings present the ability to change between the emeraldine salt form of PANi (green) to the emeraldine base form (blue) when a solution of HCl 10^{-2} M, NaOH 10^{-2} M respectively, is flushed inside the channel. Moreover, the PANi coatings shows dynamic response throughout the entire length of the channel showing that these type of coatings can be used for in situ monitoring for instance, a neutralisation reaction in microfluidic devices.

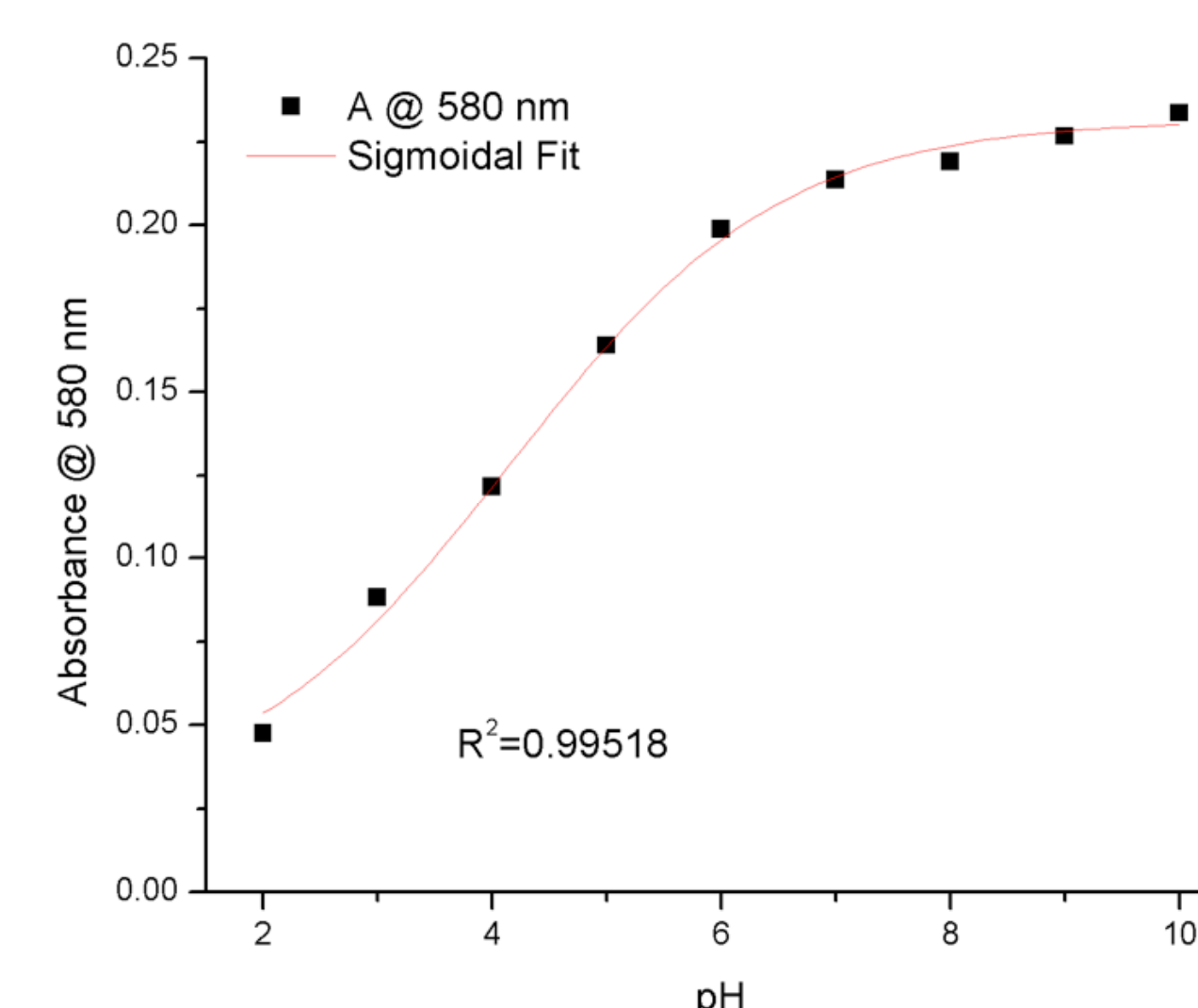
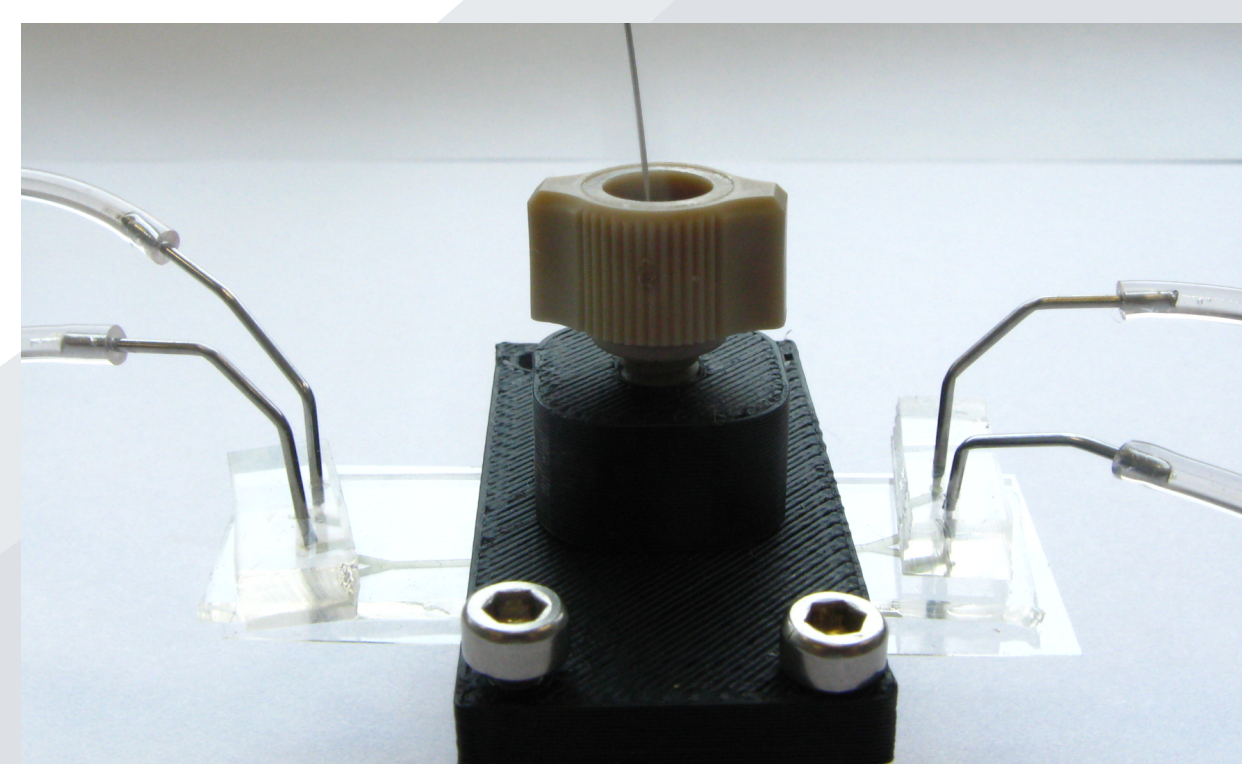
➤ UV-Vis spectroscopy

UV-vis spectra for PANi are sensitive to the conjugation and conformation of aniline rings. The EB exhibits a strong absorbance band at approximately 635 nm, which is attributed to the quinoid excitation absorption. Upon doping, the quinoid transition disappears, and new absorbance bands appear (ES).



➤ Dynamic pH sensing

The pH measurement is done in continuous flow mode while pH measurements are done using fiber-optic light guides.



➤ Conclusions

These unique coatings offer the possibility of monitoring pH in continuous flow over a wide pH range and all over the channel length, being extremely interesting technique to monitor pH dependent chemical reactions in micro-fluidic devices.

➤ Acknowledgements

This material is based upon research supported by the Irish Research Council for Science, Engineering and Technology (IRCSET) – The Embark Initiative.