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CELLULOSE-BASED MATERIALS –  
FROM SCIENCE TO TECHNOLOGY

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### **Polymer-modification of cellulose to reduce sensitivity loss in paper-based analytical devices**

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#### **Abstract**

In this work, we want to reduce the loss of sensitivity observed when immunodiagnostic processes are transferred to paper-based devices. Light scattering mainly causes these losses during detection. Multi-layers of PDMAA-co-MAz, copolymer of *N,N*-dimethylacrylamide and diazomalonic ester<sup>1</sup>, have been applied successfully for the modification of paper, through dip coating and UV crosslinking processes preceded by mechanical loading of pure cellulose, to reduce the amount of air inside, since refractive index of air is far from the refractive index of cellulose. The choice of hydrogel has been led by search for the best refractive index matching between cellulose and copolymer. In this first approach, it has been chosen to focus on *transmittance*, optimizing transparency and therefore the amount of visible light able to pass through the sample. Moreover, we are studying the influence of light scattering, because it has been noted that this process could be an “enhancer” of fluorescent signal intensity.<sup>2</sup>



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## References

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2. Hokr, B. H., and Yakovlev, V. V. (2013) Raman signal enhancement via elastic light scattering, *Opt.Express*, 21,11757-11762.

## KEYWORDS:

paper  
cellulose  
sensitivity  
crosslinking  
UV-light  
copolymer  
fluorescence  
lightscattering  
read-out  
transmittance

## Biography

Anna has studied Industrial chemistry at University of Napoli “Federico II” (Italy). Later, she obtained her Master degree in Polymer Science from the same university. During those years she focused on the study of structure and morphology of polyolefin block copolymers. Currently, she is a PhD student in Freiburg (Germany), which is in a close collaboration of Chemistry and Physics of Interfaces group, from University of Freiburg, and Macromolecular Chemistry and Paper Chemistry group, from University of Darmstadt. During the PhD, her main focus is on polymer-modification of paper cellulose by CHic-reactions for microfluidic analytical devices.

