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Glass - A Material for the Gravure Printing Process

Currently the aim of the work is the development of micro structured clichés made of photo sensitive glass for the gravure printing of electrically functionalised inks on flexible substrates. Fig. 1 gives an example of a typical gravure print device.

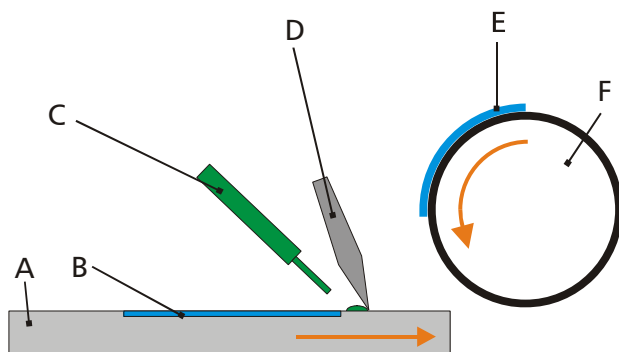


Fig. 1: Scheme of a gravure print device with printing plate (A: printing plate (metal), B: glass cliché with cells, C: spreading of ink on the printing plate, D: doctor blade to fill in the ink in the recessed cells of the glass plate, E: mechanically fixed flexible substrate (plastic or thin sheet glass), F: printing roll)

For gravure printing the surface of a printing plate with recessed elements (cells) will be covered typically with low viscosity ink. After doctor blade, which removes all the excessive ink, the ink is residual only in the recesses. A flexible substrate which is fixed on a rotating cylinder will be pressed onto the horizontal moved printing plate and takes up the ink from the recesses. Therefore micro structured glass clichés were manufactured using a three step photolithographic process [1].

In principle it is possible to realise glass clichés for the auto typical gravure print and also the half auto typical gravure print [2]. Fig. 2 shows a part of a typical gravure pattern in a photo sensitive glass plate for the printing of lines.

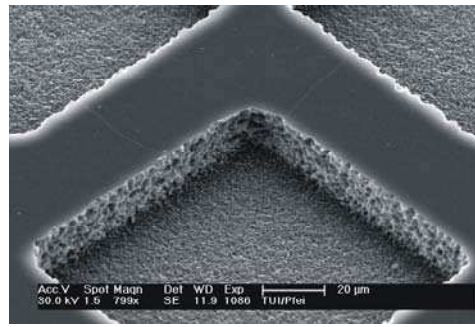
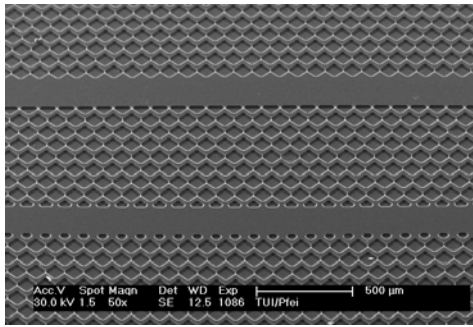


Fig. 2: Micro structured gravure pattern in a photo sensitive glass (left), single cell with an increased surface roughness of the cell walls in opposite to the no printing cliché surface (right)

Such micro structured glass plates were characterised in terms of the mechanical and chemical stability using printing process comparable conditions. Further will be discussed the influence of the geometry and surface properties of the cells at the glass clichés on gravure printed pattern [3]. Very fine lines (width < 80μm) consisting of electrically conductive inks like ITO were printed as well as large thin layers of semi conductive polymers like P3HT with thicknesses of 150nm, i.e. for the application in TFT printing processes (Fig. 3).

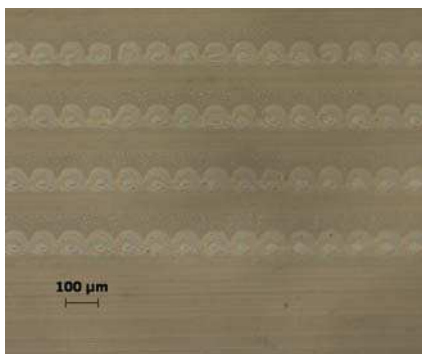


Fig. 3: Gravure printed structures using a photo structured glass cliché, ITO on a PET substrate (left), P3HT on a PET substrate (right)

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References:

- [1] D. Hülsenberg, A. Harnisch, A. Bismarck: Microstructuring of Glasses. Springer-Verlag Berlin Heidelberg 2008
- [2] B. Ollech: Tiefdrucktechnik - Grundlagen und Verfahrensschritte der modernen Tiefdrucktechnik. Polygraph-Verlag Frankfurt am Main, 1993
- [3] U. Brokmann, K. Sönnichsen, D. Hülsenberg: Application of micro structured photo sensitive glass for the gravure printing process. J. Microsystems Technologies (2008), in press

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