

EXPANDING THE PROPERTY PROFILE OF BAYFOL HX[®] FILM TOWARDS NIR RECORDING

Friedrich-Karl Bruder^a, Johannes Frank^a, Sven Hansen^a, Alexander Lorenz^a,
Christel Manecke^a, Richard Meisenheimer^a, Jack Mills^b, Anna Röhnelt^a,
Igor Pochorovski^a, Thomas Rölle^a, Lena Pitzer^a

^aCovestro Deutschland AG, Chempark Leverkusen, D-51365 Leverkusen, Germany

^bCovestro LLC, 1 Covestro Circle, Pittsburgh, PA 15205, USA

Bayfol[®] HX photopolymer films prove themselves as easy-to-process recording materials for volume holographic optical elements (vHOEs) and are available in customized grade at industrial scale.[1] Their full-color (RGB) recording and replay capabilities are two of their major advantages. Moreover, the adjustable diffraction efficiency, tunable angular and spectral selectivity of vHOEs recorded into Bayfol[®] HX as well as their unmatched optical clarity enables superior invisible “off Bragg” optical functionality. As a film product, the replication of vHOEs in Bayfol[®] HX can be carried out in a highly cost-efficient and purely photonic roll-to-roll (R2R) process. Utilizing thermoplastic substrates, Bayfol[®] HX was demonstrated to be compatible to state-of-the-art plastic processing techniques like thermoforming, film insert molding and casting, which opened up using a variety of industry-proven integration technologies for vHOEs. Therefore, Bayfol[®] HX made its way in applications in the field of augmented reality such as Head-up-Displays (HUD) and Head-mounted-Displays (HMD), in free-space combiners, in plastic optical waveguides, and in transparent screens. Also, vHOEs made from Bayfol[®] HX are utilized in highly sophisticated spectrometers in astronomy as well as in narrow band notch filters for glasses against laser strikes.

Based on a well-established toolbox, Bayfol[®] HX can be adopted for a variety of applications. To further offer access to more applications in invisible sensing and continuously improve the performance in existing applications, we recently extended our chemical toolbox to address the sensitization beyond RGB into the Near Infrared Region (NIR). In particular, the dyes of the existing films were changed towards a sensitivity in the NIR spectral region and the co-initiators varied according to the utilized dyes. In this poster, we will report on our latest developments in these fields.

[1] Bruder, F.-K., Fäcke and T., Rölle, T., "The Chemistry and Physics of Bayfol[®] HX Film Holographic Photopolymer," *Polymers* **9** (10), 472 (2017).