

Polymeric Ionic Liquid as Cathode Interlayer of Organic Photovoltaics with Improved Reproducibility¹

The applications of ionic liquids in [dye-sensitized solar cells](#) are well known. With the progress in the field of photovoltaic, however, other types of solar cells emerged as popular research areas. One of those is organic solar cell. They are normally based on polymeric materials, are cheap and easy to produce on a big scale, employ less dangerous materials and are flexible. But there is a disadvantage to organic photovoltaics: it has lower efficiency than silicon based one and degrades faster.

To mitigate those problems, cathode interlayers are used. Polyconjugated organic molecules are used as interlayer material, but are often difficult to make and expensive. On the other hand, ionic liquids proved themselves useful for the same purpose. The role of ILs is to form interfacial dipole, which decreases Schottky barrier, improves electron and hole mobility and forms better contact with cathode. Normally ILs,² like [BMIM BF₄](#) or [BenzMIM Cl](#) are coated onto the cathode. For ILs, formation of aggregates is typical and one problem with using them as interlayer is that it is extremely difficult to cast a homogenous thin film. ILs rather form droplets (aggregates) and don't cover the entire surface, so the casting procedure suffers from low reproducibility.

To overcome this issue, the use of polymerized ILs has been proposed. In polymerized ILs, molecular motion is restricted and therefore reorganizations with the droplet formation on the surface is minimized. As a result, few nanometer thick homogenous films can be obtained with high reproducibility. The comparison between [BVIM Br](#) and corresponding polymer is reported in the above-mentioned work, and it shows that with polymer, homogenous layers are obtained. The best performance was achieved for 2-3 nm thick layers and the power conversion efficiency for poly-IL devices is over 9%, compared to 6.7% for monomeric IL analogue. Furthermore, narrower distribution of the power conversion efficiencies between the series of devices was demonstrated.

Iolitec offers a selection of polymerizable ILs, that can be used as interlayer materials to improve solar cell efficiency. Please feel free to [contact us](#), if you require further information.

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2 *Org. Electron.* **2017**, *42*, 387; *Nano Energy*, **2015**, *13*, 275.