Electron-acceptor ionic liquid crystals with multifunctional properties
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Electronic and photonic devices based on ordered semiconducting materials have allowed significant advances in the organic electronics research field.[1-3] Specifically, high charge transport performances should be expected in semiconducting liquid crystals (LCs) because of their capability to form large anisotropic domains.[4] It is therefore worth to develop new LC materials with improved semiconducting properties. However, while in the last decade much effort has been addressed to the synthesis of hole-conducting materials (p-type), less attention has been paid on the development of electron-conducting ones (n-type).

Here we show the bulk multifunctional properties of a new class of π-conjugated ionic liquid crystals with electron acceptor character. These are smectic or columnar thienoviologens[4] exhibiting high fluorescence (Φ up to 68%) in the bulk state. Notably, the combination of their optical properties with high ionic conductivities and fast intermolecular electron transport leads to their unique electrochromic and electrofluorochromic functions.[5]

In addition to the above properties, preliminary photoconductivity measurements in glassy LC state at room temperature revealed good photogeneration response.

In conclusion, here we present LC materials with multifunctional advanced properties that could be exploited in a wide range of optoelectronic devices.

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References:

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