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**Ionic Liquid Embedded Polyimides with Ultra-Foldability, Ultra-Flexibility,
Ultra-Processability and Superior Optical Transparency**

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Abstract

New generation spacecraft technology requires more and more deployable, light-weight, thin polymer films, in particular novel polyimide materials with high optical transparency, excellent foldability and superior flexibility. In this work, we develop a highly transparent, ultra-foldable, ultra-flexible and ultra-processable polyimide composite material by incorporating 5~8 wt% of ionic liquid 1-ethyl-3-methylimidazolium bis((trifluoromethyl)sulfonyl)imide into colorless polyimide matrices. This 23-micrometer-thick polyimide composite film exhibits a high optical transmittance of 90.4% even at 450 nm wavelength and an incredibly low cutoff wavelength of 273 nm. It is an extremely strong and flexible material, with a tensile modulus of 844.6 MPa, a tensile strength of 48.2 MPa, a high elongation at

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