Highly Flexible Organic Light-Emitting Diodes with Conventional Transparent Conductive Oxides

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The mechanical flexibility of organic light-emitting diodes (OLEDs) is regarded as the core capability that differentiates them from other light sources.(1) Unfortunately, the flexibility of OLEDs are often limited by that of transparent electrodes (TEs) due to the brittle nature of transparent conductive oxides (TCOs) commonly used in OLEDs.(2)

However, highly flexible OLEDs can still be made with conventional TCOs by reducing the thickness of a substrate. In this work, ultra flexible and highly efficient OLEDs are demonstrated on 6-μm-thick polymer thin films with indium zinc oxide (IZO) electrodes. With a careful optimization considering both optical structure leading to cavity resonance enhancement and tensile strain expected at a given bending radius, highly efficient OLEDs are demonstrated that exhibit virtually no changes in the luminescence and electrical characteristics after 1,000 bending even at the bending radius as small as 300 μm.

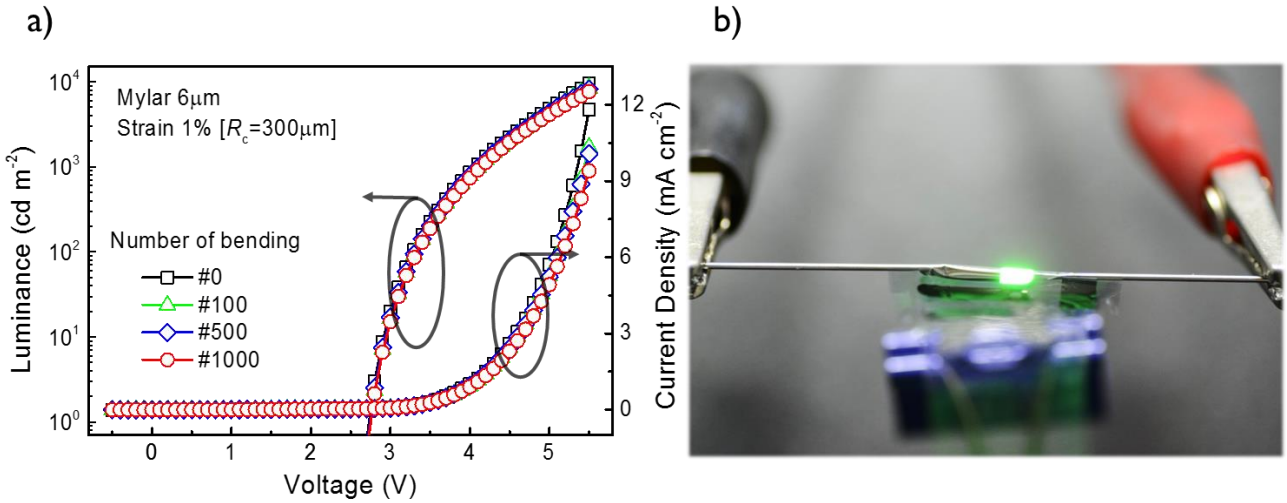

Fig. 1. a. *J-V-L* graph during 1000 times bending. b. Operating images at 300 μm bending radius condition

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