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Field-induced activation of metal oxide semiconductor for low temperature flexible transparent electronic device applications PUSHPA RAJ PUDASAINI, JOO HYON NOH, ANTHONY WONG, AMADA HAGLUND, The University of Tennessee, THOMAS ZAC WARD, Materials Science and Technology Division, ORBL, Oak Ridge, TN 37831, USA, DAVID MANDRUS[1], PHILIP RACK[2], The University of Tennessee — Amorphous metal-oxide semiconductors have been extensively studied as an active channel material in thin film transistors due to their high carrier mobility, and excellent large-area uniformity. Here, we report the athermal activation of amorphous indium gallium zinc oxide semiconductor channels by an electric field-induced oxygen migration via gating through an ionic liquid. Using field-induced activation, a transparent flexible thin film transistor is demonstrated on a polyamide substrate with transistor characteristics having a current ON-OFF ratio exceeding 108, and saturation field effect mobility of 8.32 cm2/(V.s) without a post-deposition thermal treatment. This study demonstrates the potential of field-induced activation as an athermal alternative to traditional post-deposition thermal annealing for metal oxide electronic devices suitable for transparent and flexible polymer substrates.

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