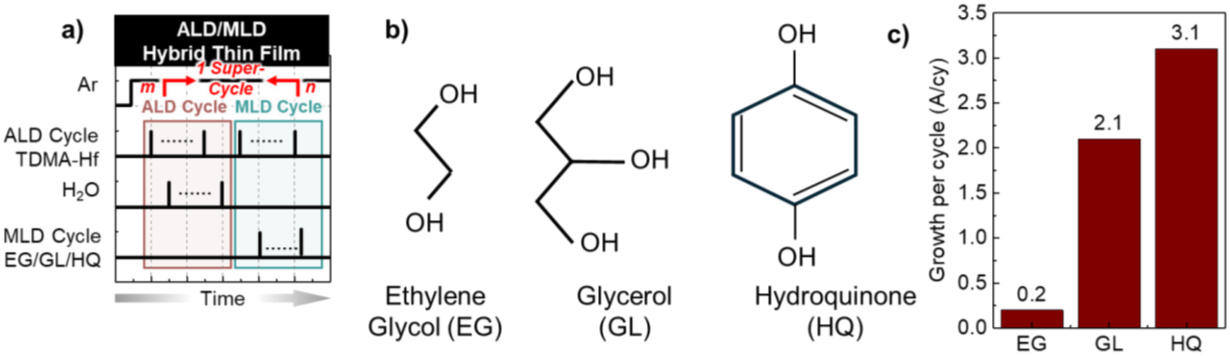

Fig. 1. (a) Illustration for the super-cycle approach combining 'm' ALD cycles and 'n' MLD cycles. (b) Structure of precursors EG, GL and HQ (c) Controllable GPC by adjusting number of ALD-MLD cycles

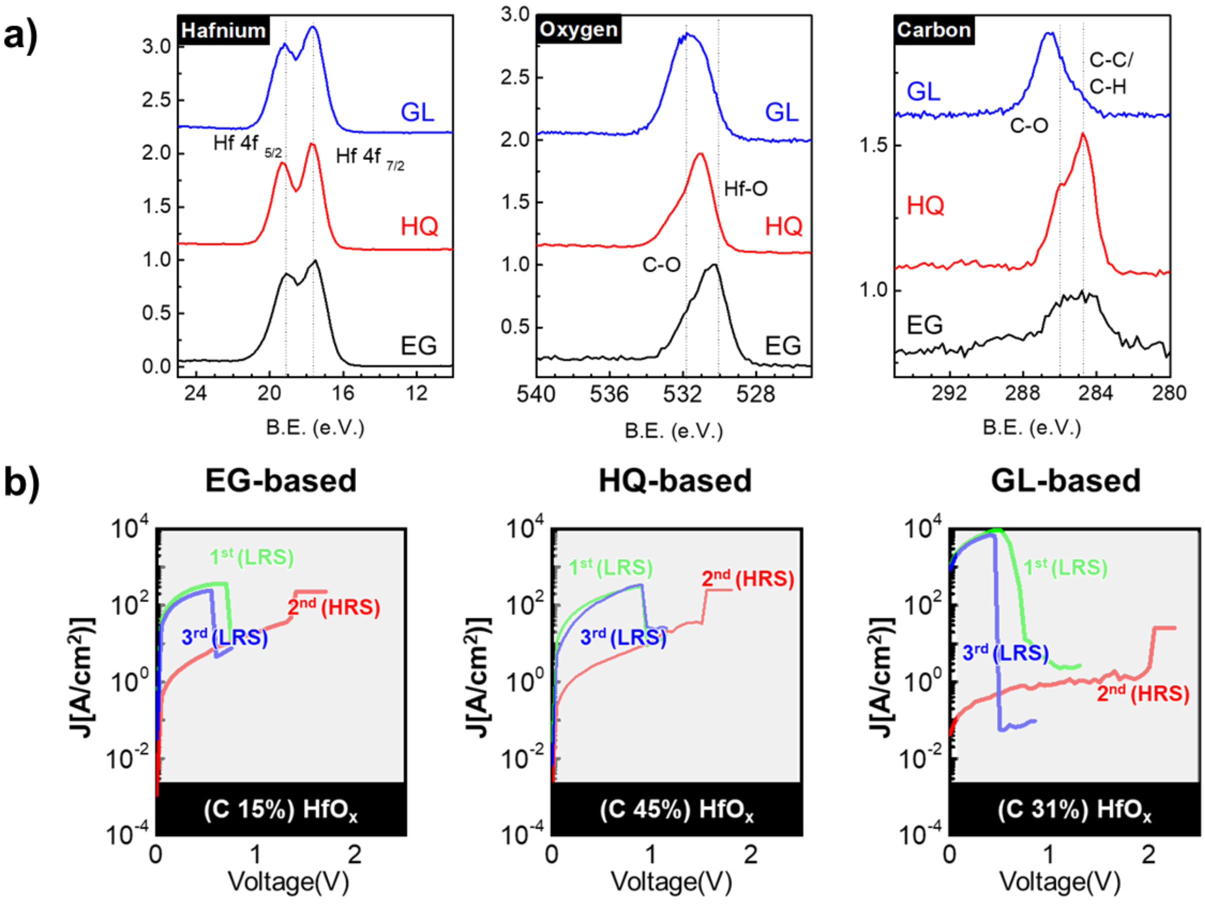

Fig. 2. (a) XPS compositions for 10nm 1-1 ALD-MLD super-cycle films for all the three precursors, showing different chemical compositions. Spectra obtained are after GCIB sputtering (b) J–V characteristics of 10 nm-thick HfO_x memristive devices characterized by different carbon concentrations in HfO_x for EG, HQ and GL based devices.