Fabrication of Highly \{110\}-oriented Ba(Ce,Y)O$_3$ Perovskite Thin Films
by RF-magnetron Sputtering Method

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10mol% Y-doped BaCeO$_3$ (BCYO) perovskite thin films were directly deposited on (111)Pt/TiO$_2$/SiO$_2$/Si (abbreviated as Pt/Si) substrates by an RF-magnetron sputtering method. The deposition conditions including deposition temperature, sputtering pressures, and kinds of sputtering gas were examined to obtain well-crystallized BCYO thin films. The deposited films were characterized by the powder X-ray diffraction (XRD) with CuK$_\alpha$ radiation and the field emission scanning electron microscopy (FE-SEM). The wide-range reciprocal space mapping of \(\theta\)-2\(\theta\) and \(\psi\)-2\(\theta\) scans were also employed to investigate their preference of crystallographic orientations.

Figure 1 shows a wide-range reciprocal mapping image and its integration of the BCYO thin films. The strong spots of \{110\} BCYO were observed at \(\theta=28.7^\circ\), \(\psi=0, 60^\circ\) and \{200\} BCYO at \(\theta=41.1^\circ\), \(\psi=45^\circ\), which means highly \{110\} -oriented BCYO films with pseudo-cubic structure can be deposited directly on the Pt/Si substrates. Though we have already reported the preferred orientation control in <110> direction of perovskites on Pt/Si substrates by using a (101)PdO///(111)Pd buffer [1], this results suggest we have successfully deposited \{110\}-orientated perovskite thin films without using any buffer layers. We consider this BCYO thin film can be used as a seed layer to obtain \{110\}-oriented perovskites.

Acknowledgements: We would like to thank to JSPS KAKENHI Grant Number 26420284, JST A-STEP, Canon Foundation and RIEC, Tohoku Univ. for their financial supports.