

HfO ₂	Density (g/cm ³)	GPC (Å/cy)	RI @633nm	O%	Hf%	O:Hf	C%
O ₃	8.3	0.77	1.977	54.7	23.3	2.4	3.2
CRISP	8.9	0.99	1.993	51.4	23.2	2.2	1.8
Bulk	9.68	N/A	2.1	50	25	2.0	0.0

Table 1: Film properties of the thermal HfO₂ processes with O₃ and the CRISP conversion process in the same tool deposited at 250°C. A comparison of the expected bulk film properties is included.

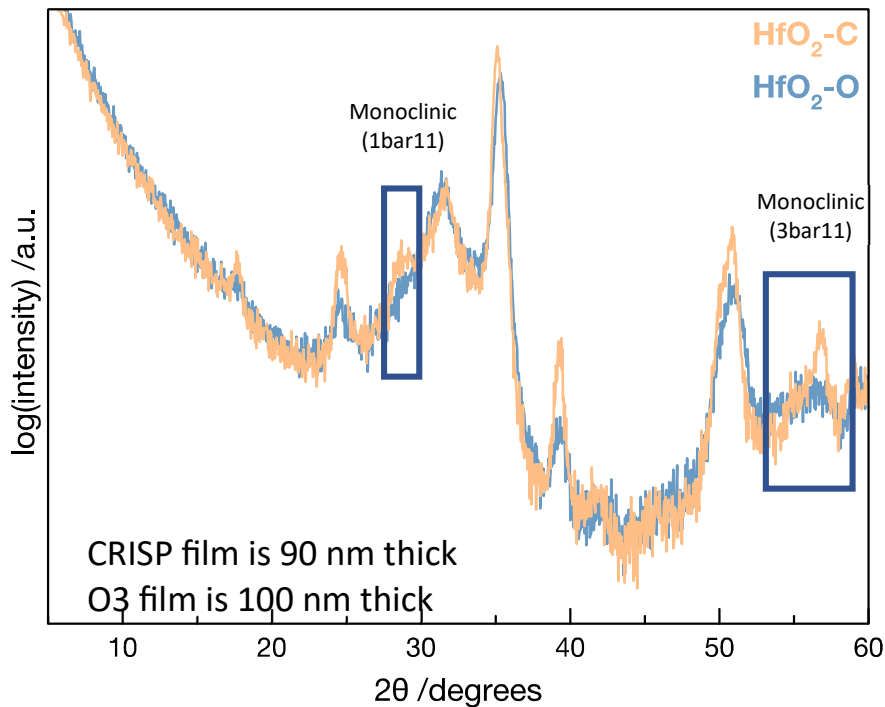


Figure 1: X-ray diffraction data for films deposited with O₃, blue, and the CRISP process, orange. Not only does the CRISP process show more crystalline behavior, but there are also morphological differences. Most pronounced, the CRISP process shows a preference for the 1bar11 crystal face.