Properties of Ti$_8$C$_5$ thin films created at different temperatures using magnetron sputtering

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— We were able to create thin films of Ti$_8$C$_5$ on c-axis oriented single crystal Al$_2$O$_3$ using both co-deposition magnetron sputtering and reactive magnetron sputtering. While TiC is generally used as a precursor film when making “on-chip” super capacitors, Ti$_8$C$_5$ is of similar composition and may have some advantages when making super capacitors. The Ti$_8$C$_5$ is more porous and demonstrates slightly different properties than TiC. Film deposition was optimized using elemental composition data obtained by WDXRF and characterized using XRD. It was found that composition and phase of Ti$_8$C$_5$ greatly depended on the temperatures at which the samples were grown. We outline the different parameters at which Ti$_8$C$_5$ grows best by outlining features of the Ti-C phase diagram.