For the continued development of UHTCMCs manufactured using Reactive Melt Infiltration (RMI), experiments have been conducted determining the wetting and chemical behaviors of AgZr2, Zr2Cu and Cu alloys when in contact with carbide (NbC, TaC), nitride (HfN, ZrN) and boride (TiB2) substrates. Drop-shape images of the melt’s shadow have been video recorded to determine the droplet’s contact angle against temperature and time. Resultant phase formations have been investigated and analyzed using SEM, EDX and XRD. The purpose of these experiments is to further understand the RMI process and determine potential material candidates for fiber coatings. The infiltration height of molten metals within capillary systems is highly dependent on these contact angles, and as such; it is important that the chosen fiber coating positively influences wetting behavior. In order to successfully maintain mechanical performance, minimal reactivity between the melt and coating was desired. This allows for adequate degradation protection without the need for thick coating layers. Further investigations will take the most promising candidates and attempt to integrate them into the existing process.