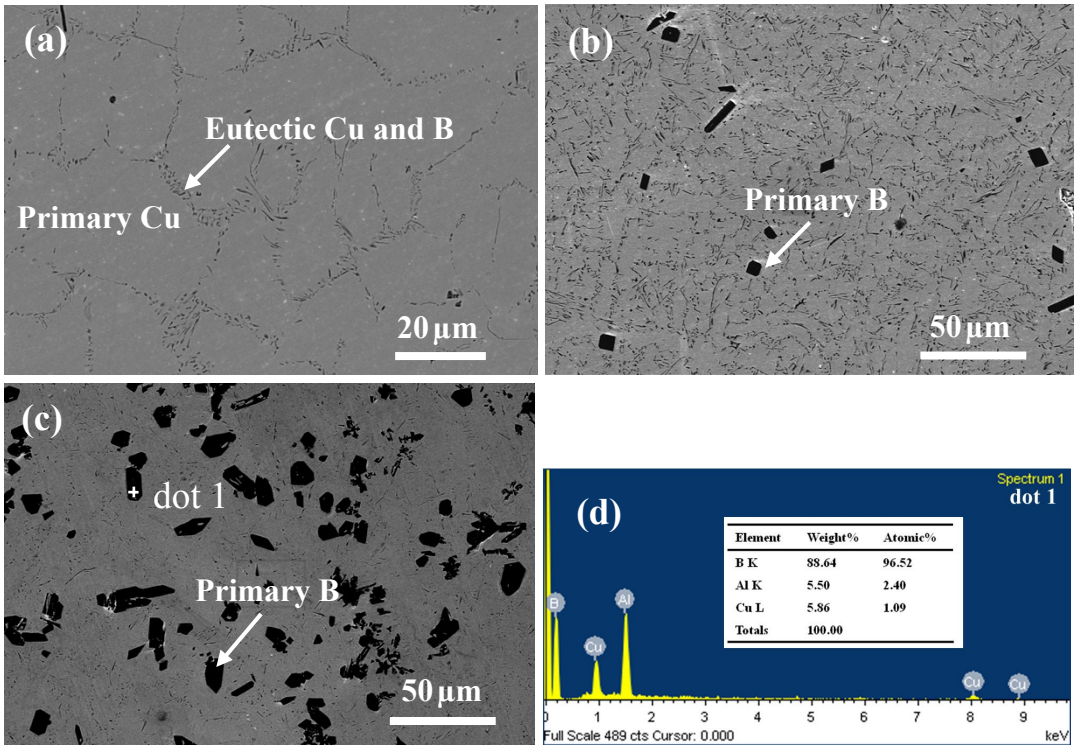

Figure S1. Typical microstructure and of Cu-B alloys cooled at a cooling rate of about 20K/s. (a) Cu-1wt.%B; (b) Cu-2.5wt.%B; (c) Cu-4wt.%B; (d) EDX analysis of dot 1 in Fig.2(c);

Cu-B alloys were then prepared by the simple direct melt reaction process. Typical microstructures of Cu-B alloys cooled at a cooling rate of about 20K/s with different composition are shown in Fig. S1 and are consistent with the Cu-B phase diagram. Fig.S1(a) shows a microstructural image of the typical hypoeutectic Cu-1wt.%B alloy with primary Cu and eutectic structure (eutectic Cu and eutectic B), while Fig.S1(b) shows a near eutectic microstructural image of the Cu-2.5wt.%B alloy in which primary B has precipitated and a higher content of eutectic structure can be found. Fig.S1(c) shows a typical hypereutectic microstructure image of the Cu-4wt.%B alloy with large amounts of precipitated primary B. In this alloy, the eutectic

structure can also be found in the Cu matrix. The chemical composition of primary B was analyzed by EDX (Fig. S1(d)), and the results show that the atomic percentage of B is higher than 96%, indicating that the solid solution of Cu and Al in B is very low in the primary B of the Cu-B system.