Supplementary Materials

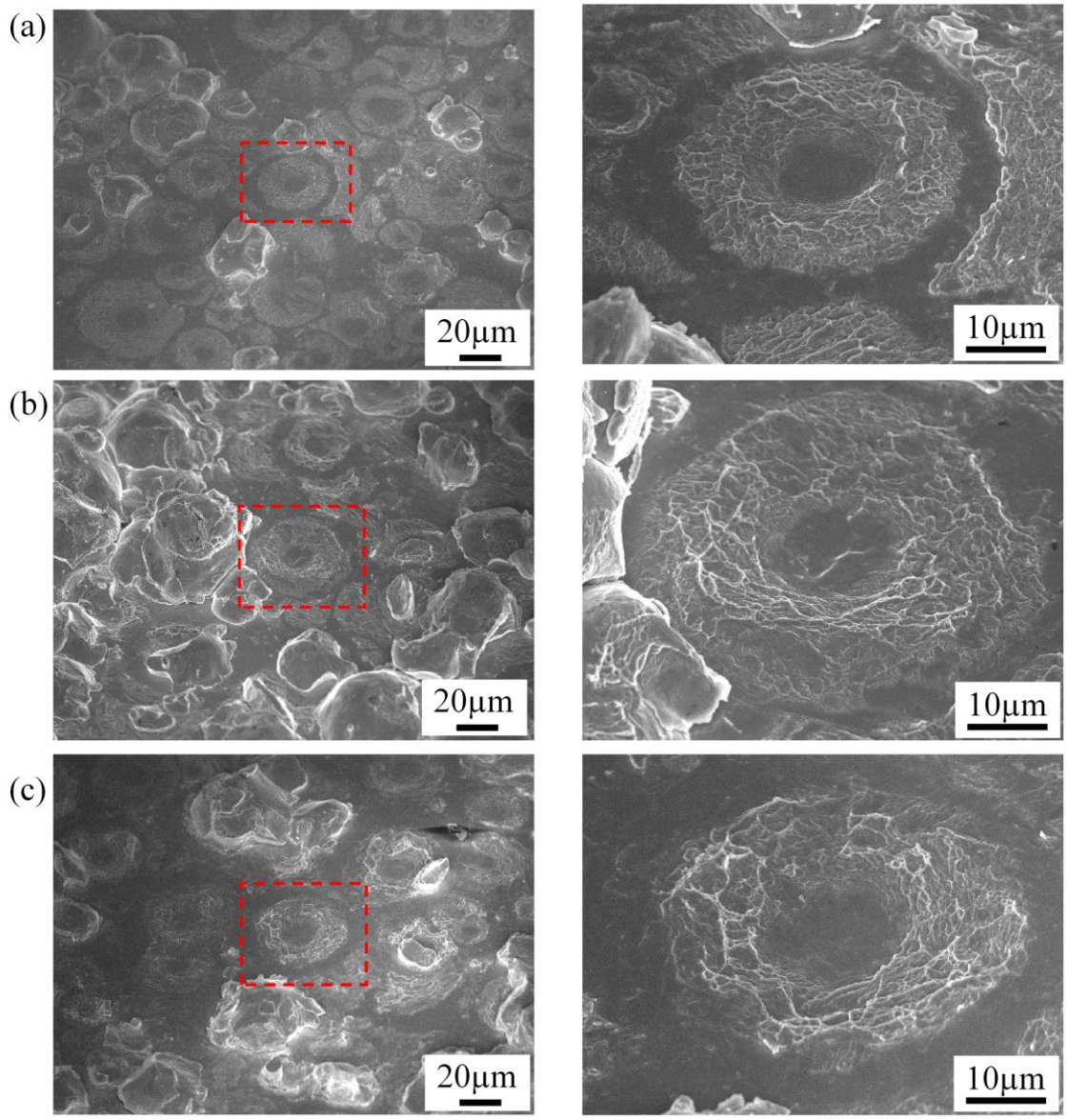

Figure S1. SEM micrographs of fractured interfaces on the substrate side for the coatings deposited at particle velocities of (**a**) 760, (**b**) 800 and (**c**) 827 m/s, observed under different magnifications at a tilted angle of 45°.

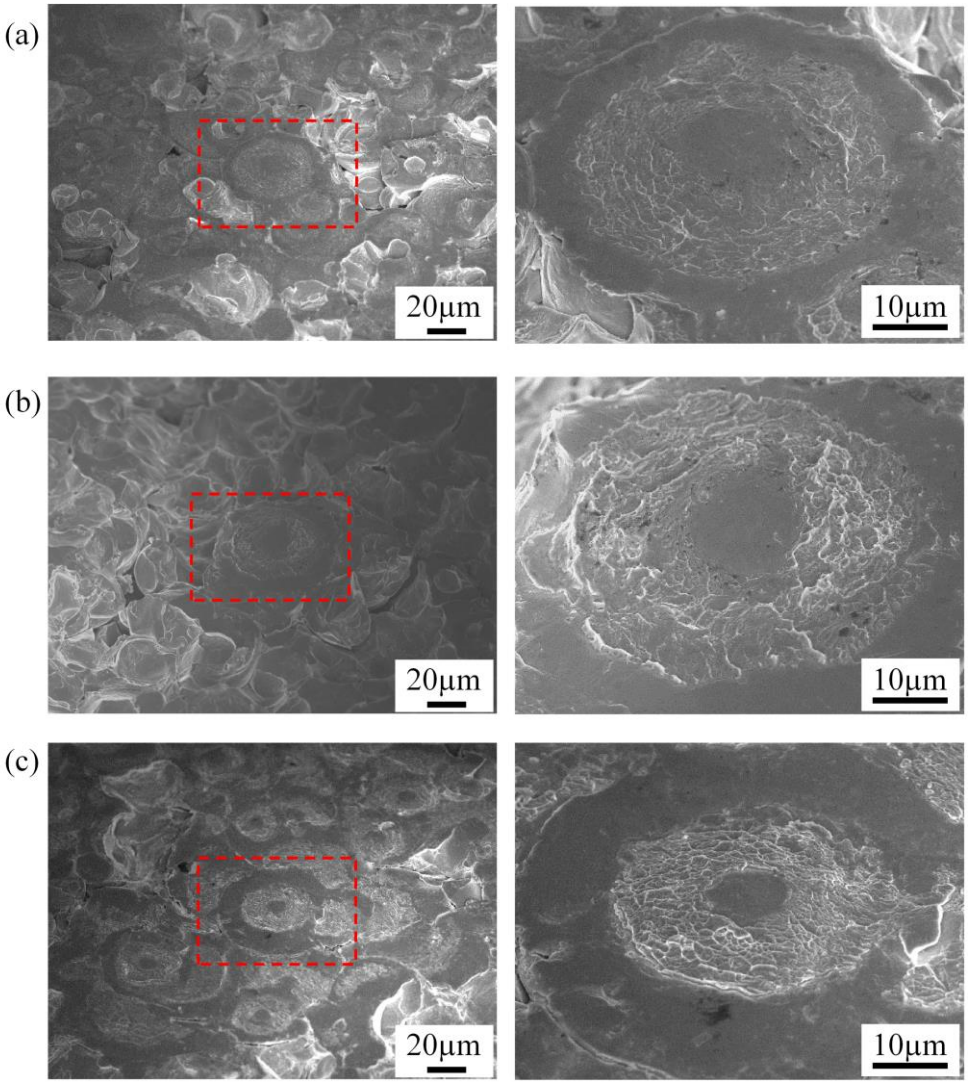

Figure S2. SEM micrographs of fractured interfaces on the coating side for the coatings deposited at particle velocities of (**a**) 760, (**b**) 800 and (**c**) 827 m/s, observed under different magnifications at a tilted angle of 45°.

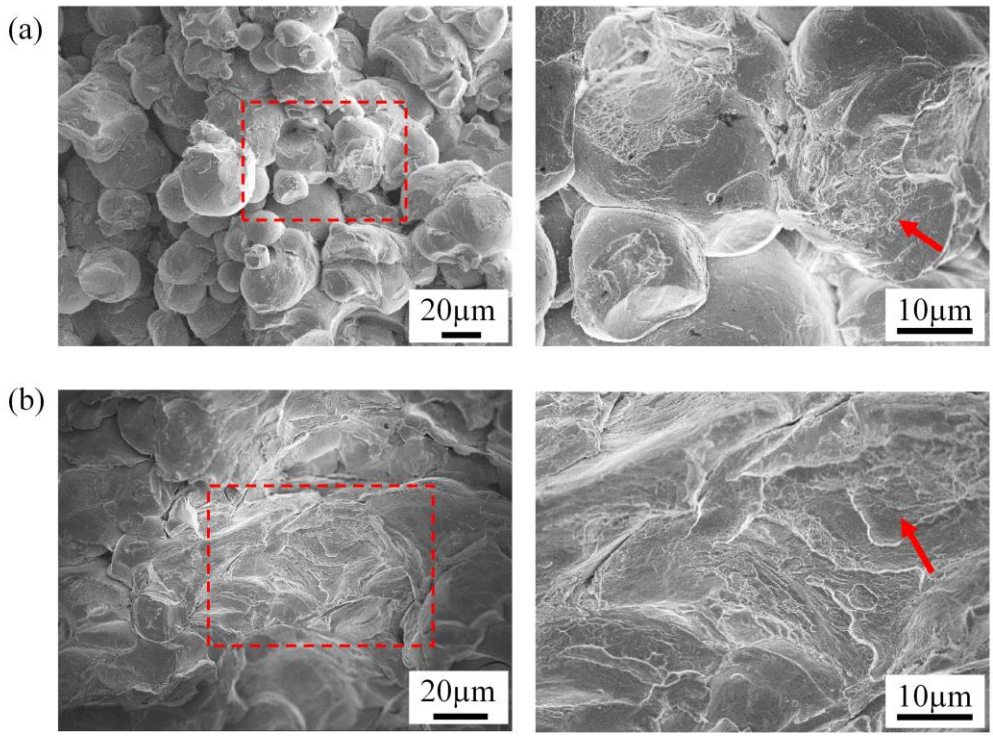

Figure S3. SEM micrographs of fractured cross-sections of the coatings deposited at particle velocities of (**a**) 760 and (**b**) 827 m/s under different magnifications.

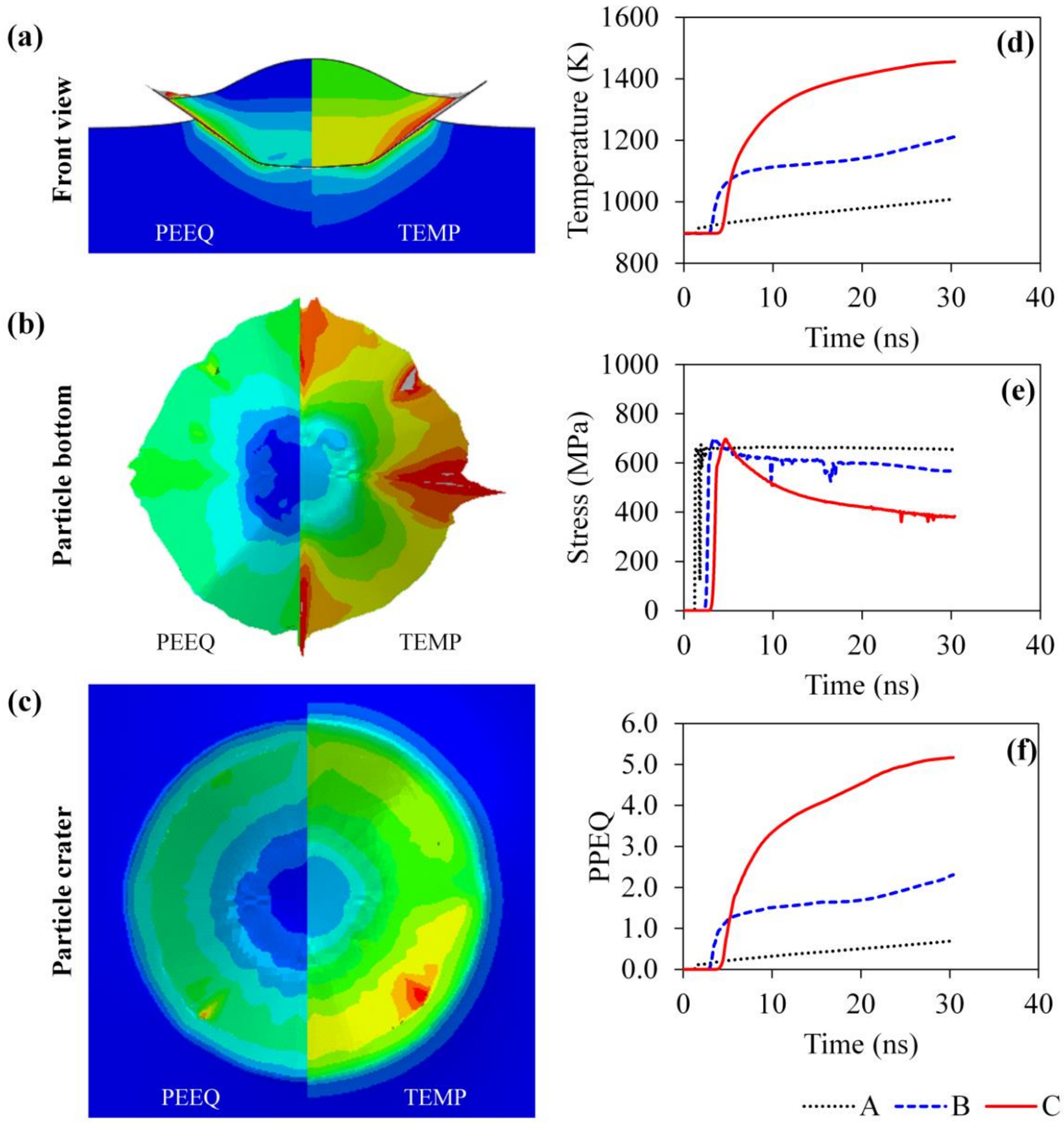

Figure S4. (**a**–**c**) Simulated deformation and temperature profiles of a Ti64 particle impacted on a Ti64 substrate at particle velocity of 800 m/s at 30 ns for different views and (**d**–**f**) temperature, stress and strain evolutions of elements A, B and C at the interfaces of Ti64 particles impacted at 800 m/s, for the duration of 30 ns. The scale bar for temperature and equivalent plastic strain, PEEQ, of particle impact is shown in Figure 12.