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In situ TEM techniques for coatings investigations

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Over the past decades, the applications of transmission electron microscopy (TEM) have shifted from observation of static illustrations to in situ measurements of mechanical properties and structural changes. It provides the chance to observe at the atomic level materials responses to an external impact, discover transient states during chemical or structural transformations, and correlate materials structure to their functionalities. In present study in situ TEM techniques were employed in investigations of hardness, adhesion, crack resistance as well as diffusion processes and thermal stability of hard nanocomposite and multilayer coatings. Using FIB method different shapes of samples were fabricated and size-properties relationships were evaluated and compared with common micro- and macroscale techniques. This research brings about mechanical properties and behavior of coatings at high temperatures which impact the reliability and performance of special modern nanodevices and opens new data about well-known materials.

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Keywords

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multicomponent coatings