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Temperature-dependent barrier characteristics of Pd/ZnO Schottky barrier diodes

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Abstract content
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The current-voltage (I-V) characteristics of Pd/ZnO Schottky barrier diodes were measured in the 30-370K temperature range and have been interpreted based on the assumption of a Gaussian distribution of the barrier heights due to the barrier inhomogeneities that prevail at the interface. It shows that the occurrence of a Gaussian distribution of the barrier height is responsible for the decrease of the apparent barrier height, increase of the ideality factor n and non-linearity in the activation energy plot at low temperature. The inhomogeneities are considered to have a Gaussian distribution mean barrier height of $= 0.985$ eV and a standard deviation of $=0.022$ V at zero bias. Furthermore, the mean barrier height and the Richardson constant values were obtained as 0.883 and 0.541 A K⁻²cm⁻², respectively by means of the modified Richardson plot. Hence, it has been concluded that the temperature dependence of the I-V characteristics of the Schottky barrier on Pd/ZnO can be successfully explained based on thermionic emission mechanism with a Gaussian distribution of the barrier heights.

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