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Superconducting State Parameters of Be-Zr Glassy Alloys

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Abstract: The theoretical investigation of the superconducting state parameters (SSP) viz. electron-phonon coupling strength λ , Coulomb pseudopotential μ^* , transition temperature T_C , isotope effect exponent α and effective interaction strength $N_O V$ of $Be_c Zr_{1-c}$ ($c= 0.30, 0.35, 0.40$ and 0.45) metallic glasses have been reported using Ashcroft's empty core (EMC) model potential for the first time. Five local field correction functions proposed by Hartree (H), Taylor (T), Ichimaru-Utsumi (IU), Farid et al. (F) and Sarkar et al. (S) are used in the present investigation to study the screening influence on the aforesaid properties. It is observed that the electron-phonon coupling strength λ and the transition temperature T_C are quite sensitive to the selection of the local field correction functions, whereas the Coulomb pseudopotential μ^* , isotope effect exponent α and effective interaction strength $N_O V$ show weak dependences on the local field correction functions. The T_C obtained from H-local field correction function are found an excellent agreement with available theoretical or experimental data. Also, the present results are found in qualitative agreement with other such earlier reported data, which confirms the superconducting phase in the metallic glasses.

Key Words: Pseudopotential, superconducting state parameters, Be-Zr metallic glasses

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