Modification of SiO_2 powders by using a MDFR

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Recently, various kinds of attempts have been made to avoid the formation of undesirable components during the formation of main target materials. One of them is the incorporation of target materials to inert media such as SiO_2. However, the SiO_2 should be modified to be applied in a specific target usage and field. To explore the new functions and characteristics of SiO_2 powders, Zn^{2+} were doped into the surface of SiO_2 powders. A MDFR was employed to prepare SiO_2:Zn powders continuously and effectively. Effects of continuous U_C, U_{MB} and C_{Zn} on the structural, optical and electrical properties of SiO_2:Zn powders were investigated. Some parts of Si^{4+} in the host materials were substituted by Zn^{2+}. The substitution was promoted by increasing in U_{MB}. The substitution of Si^{4+} by Zn^{2+} could reduce the bandgap energy between the conduction band of Si^{4+} and the valence band of O_{2p}. The increase in U_{MB} led to the reduction of bandgap energy of SiO_2:Zn powders by forming an intrinsic energy level such as acceptor level to the conduction band. SEM analysis showed that the SiO_2:Zn powders were spherical and highly porous with extremely wrinkled and furrowed, with increasing U_{MB} and C_{Zn}.