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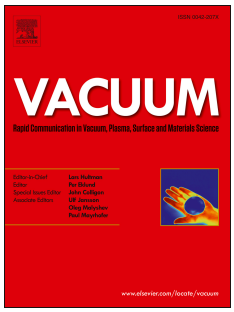

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Growth and Characterization of Zinc Oxide Thin Films on Flexible Substrates at Low Temperature Using Pulsed Laser Deposition

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Abstract

The emerging technological demand of light weight, transparent and flexible electronic devices has raised the exploration of new semiconductor materials beyond silicon. ZnO has the potential to be integrated into flexible electronics matrix due to its excellent electrical and optical properties. Here, we have fabricated ZnO thin films on flexible polymer substrates, polyimide (Kapton) and polyethylene naphthalate (PEN), at room temperature and at 100 ^{o}C using PLD. These films grew along (002) axis of the hexagonal wurtzite lattice and show n-type semiconducting nature. Crystallinity of films on Kapton is better than that on PEN. Films grown at 100 ^{o}C show improved optical transmittance and lower thermal activation energy. Film deposited on Kapton at 100 ^{o}C shows highest Hall mobility and lowest resistivity values. UV photoconductivity measurements show good opto-electronic properties for these films. Films on Kapton show higher photocurrent value and faster response and decay time (~ 1 s). Seebeck coefficient measurement shows higher thermopower values of 82 μV/K for films on PEN. These characteristics make the low temperature pulse laser deposited ZnO films on Kapton and PEN attracting for electronic devices with various opto- and thermo- electrical applications.

Key words: ZnO, thin films, pulsed laser deposition, flexible substrates

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