**SUPPLEMENTARY INFORMATION**

**Nanoindentation and Nanoscratch Behavior of ZnO:Pr Thin films Deposited by DC-Sputtering**

***Vipul Bhardwaj1, Ashwani Kumar2, Rajib Chowdhury3, R. Jayaganthan1, 4,\****

1Department of Metallurgical and Materials Engineering,

Indian Institute of Technology Roorkee, Roorkee-247667

2Institute Instrumentation Centre

Indian Institute of Technology Roorkee, Roorkee-247667

3Department of Civil Engineering

Indian Institute of Technology Roorkee, Roorkee-247667

4 Department of Engineering Design,

Indian Institute of Technology Madras, Chennai-600036

**\*Corresponding author:** [**rjayafmt@iitr.ac.in, edjay@iitm.ac.in**](mailto:rjayafmt@iitr.ac.in,%20edjay@iitm.ac.in)

Uncoated substrates i.e. glass substrate and fused quartz mechanical properties are provided in Fig. S1. The hardness of uncoated glass substrate is 8.1±1.19 GPa and Young’s modulus, 89.5±10.1 GPa, respectively in Fig. S1(a) [1](#_ENREF_1). The fused quartz exhibited the hardness and Young’s Modulus, 9.31±0.35 GPa and 73.6±1.42 GPa, respectively in Fig. S1(c) [2](#_ENREF_2). The scratch curve of normal forces and lateral forces were found to be free from any discontinuity, and average coefficient of friction for fused quartz and glass substrate found to be 0.15-0.2 and 0.2-0.24, respectively.

D:\Article\Pr doped ZnO\Re-Revised Figure 7.tif

**Figure S1**- (a) Uncoated glass substrate loading-unloading curves, (b) Uncoated glass substrate scratch curves, (c) Uncoated fused quartz substrate loading-unloading curves, (d) Uncoated fused quartz substrate scratch curves.

Reference

1. Y.-C. Huang and S.-Y. Chang: Substrate effect on mechanical characterizations of aluminum-doped zinc oxide transparent conducting films *Surface and Coatings Technology.* **204**, 3147 (2010).

2. A. Dey, R. Chakraborty and A.K. Mukhopadhyay: Nanoindentation of soda lime–silica glass: effect of loading rate *International Journal of Applied Glass Science.* **2**, 144 (2011).