

Abstract Submitted  
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**Temperature rise due to Joule heating in a spin transfer torque nano-pillar structure**<sup>1</sup> CHUN-YEOL YOU, SEUNG-SEOK HA, Dept. of Physics, Inha University, HYUN-WOO LEE, Dept. of Physics, Pohang University of Science and Technology — Considering that the spin-transfer-torque-induced magnetization dynamics in a nano-pillar structure usually requires a large current density of  $10^{11}$  A/m<sup>2</sup>, it is desired to have an accurate estimation of the temperature rise caused by the current-induced Joule heating. We investigate the current-induced heating effect in the nano-pillar by analytical and numerical methods. We employ the Green's function method to obtain analytic solution of the heat conduction equation. With proper approximations, we derive a simple analytic relation that expresses the temperature in term of the current density, the geometry of the nano-pillar, and material properties. The validity of the analytic expression is confirmed by the comparison with commercial finite element method software.

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