Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Microwave Switching in Amorphous-Carbon Quantum Wells SOMNATH BHATTACHARYYA, LUIS GOMEZ ROJAS, S. RAVI. P. SILVA, Nano-Electronics Centre, Advanced Technology Institute, University of Surrey, Guildford, GU2 7XH, UK — Demonstration of long phase coherence length showing resonant tunnelling and fast switching in amorphous carbon quantum well structures has recently been established [1]. Here we show a bias controlled reversible switching of the complex impedance by transmitting a microwave signal up to $110\,GHz$ through amorphous carbon resonant tunnel diodes. By employing a coplanar waveguide technique and through the analysis of the return loss (S_{11}) microwave enhanced mobility greater than $30 cm^2 (Vs)^{-1}$ in the delocalized regime of (filamentary) conduction in these devices is demonstrated. Also a switching behaviour at about $85\,GHz$ can also be observed. We suggest a new model for the microscopic origin of the increased mobility and show routes to achieve longer coherence lengths. In addition microwave conductance of carbon quantum wells parallel to their plane and across a channel length larger than 100 nm determines the momentum scattering time of electrons in carbon. These results exhibit a potential for pure amorphous carbon-based fast memory devices. [1] S. Bhattacharyya, S.J. Henley, E. Mendoza, L. Gomez Rojas, J. Allam and S.R.P. Silva, Nature Mater. **5**, 19 (2006).

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Date submitted: 30 Nov 2006 Electronic form version 1.4