Memristor Presentation

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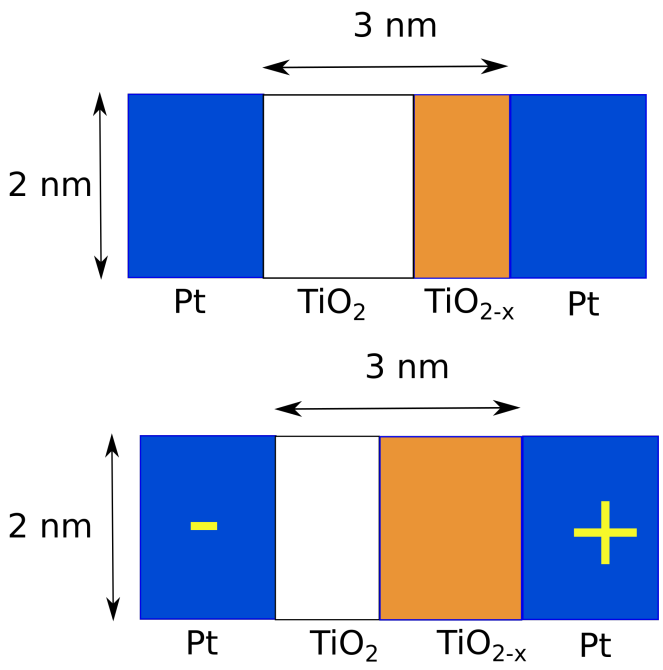
Outline

The Memristor

- Two-terminal, non-volatile device
- Made of resistant TiO_2 and conductive TiO_{2-x}
- Applying voltage alters the state



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Comparison to Other Memories

Not shown in the chart:

- Memristors are potentially cheaper to manufacture than flash.
- DRAM energy shown does not account for refreshing.

Table 1 Comparison of data storage technologies. (Data drawn from public sources and HP internal research)

	Memristor	PCM	STT-RAM	DRAM	Flash	HD
Chip area per bit (F^2)	4	8–16	14–64	6–8	4–8	n/a
Energy per bit (pJ)[2]	0.1–3	2–100	0.1–1	2–4	10^1–10^-	10^6–10^7
Read time (ns)	<10	20–70	10–30	10–50	25,000	5–8x10^6
Write time (ns)	20–30	50–500	13–95	10–50	200,000	5–8x10^6
Retention	>10 years	<10 years	Weeks	<Second	~10 years	~10 years
Endurance (cycles)	~10^{12}	10^7–10^8	10^{15}	>10^{17}	10^3–10^6	10^{15} ?
3D capability	Yes	No	No	No	Yes	n/a

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Discussion

Questions?