CLAIMS

1. A method of controlling the data bit rate of data stored on a polymer passing through a nanopore in a nanopore-based memory device, comprising:
   receiving a reference mean bit rate;
   receiving data bits read from the data stored on the polymer and determining a real-time instantaneous bit rate;
   calculating an actual mean bit rate based on the instantaneous bit rate;
   calculating a bit rate difference between the reference mean bit rate and the actual mean bit rate; and
   dynamically controlling a steering voltage which controls the data bit rate of data stored on the polymer passing through the nanopore, such that the actual mean bit rate is maintained substantially at the reference mean bit rate.

2. The method of claim 1, wherein the controlling the steering voltage is performed by dynamic control logic.

3. The method of claim 2, wherein the dynamic control logic comprises at least one of: a proportional-integral (P-I), proportional, proportional-integral-derivative (P-I-D), low pass (LP), high pass (HP), bandpass (BP), quadratic (2^{nd} order), linear, non-linear, lead/lag, and multi-order control.

4. The method of any foregoing claim wherein the steering voltage creates an electric field which is proportional to velocity of the polymer passing through the nanopore.

5. The method of any foregoing claim wherein data is stored in a nanopore polymer memory device, the device having an add “0” chamber, an add “1” chamber, and a “deblock” chamber.

6. The method of any foregoing claim wherein the reference mean bit rate is set to a first value when the device is reading data and set to a second value when the device is writing data.

7. The method of any foregoing claim wherein the reference mean bit rate for reading data or writing data changes based on where along a polymer memory string the data is located when being read or written.

8. The method of any foregoing claim wherein the reference mean bit rate for reading data or writing data changes based on the digital data pattern stored on the polymer as it passes through the nanopore.

9. A method of storing and reading digital data, comprises:

providing a nanopore polymer memory device having at least one memory cell comprising at least two addition chambers each arranged to add a unique chemical construct (or codes) to a polymer (or DNA) string when the polymer enters the respective addition chamber, the data comprising a series of the codes;

successively steering the polymer at a bit rate through the nanopore into the addition chambers to add the codes to the polymer to create the digital data pattern on the polymer; and

accurately controlling the bit rate of the polymer using a servo controller.

10. The method of claim 9 further comprising steering the polymer through the nanopore at a read bit rate to read the codes on the polymer and wherein the controller controls the read bit rate of the polymer when reading the codes stored on the polymer.

11. The method of claim 9 or 10, wherein the controller comprises dynamic control logic comprises at least one of: a proportional-integral (P-I), proportional, proportional-integral-derivative (P-I-D), low pass (LP), high pass (HP), bandpass (BP), quadratic (2^{nd} order), linear, non-linear, lead/lag, and multi-order control.

12. The method of any of claims 9 through 11 wherein the device comprises a plurality of memory cells and the servo controller controls the bit rate for each of the memory cells independently.