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Supplementary Materials for

Self-assembly of highly sensitive 3D magnetic field vector angular encoders

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This PDF file includes:

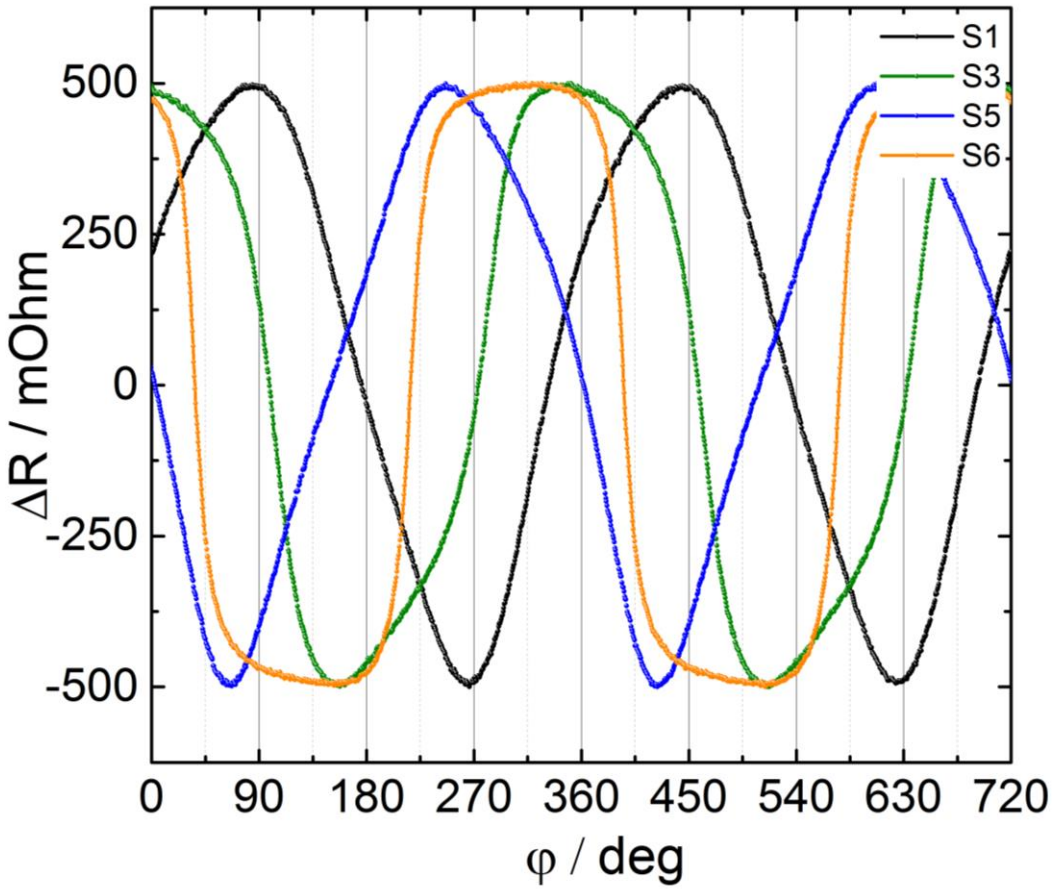

Fig. S1. Characteristic of the *ZY* and *XZ* pairs (S1 and S3 and S5 and S6, respectively) of the orthogonal magnetic sensors formed on the opposite sides of the respective tube with the field rotating in the *XY* plane.

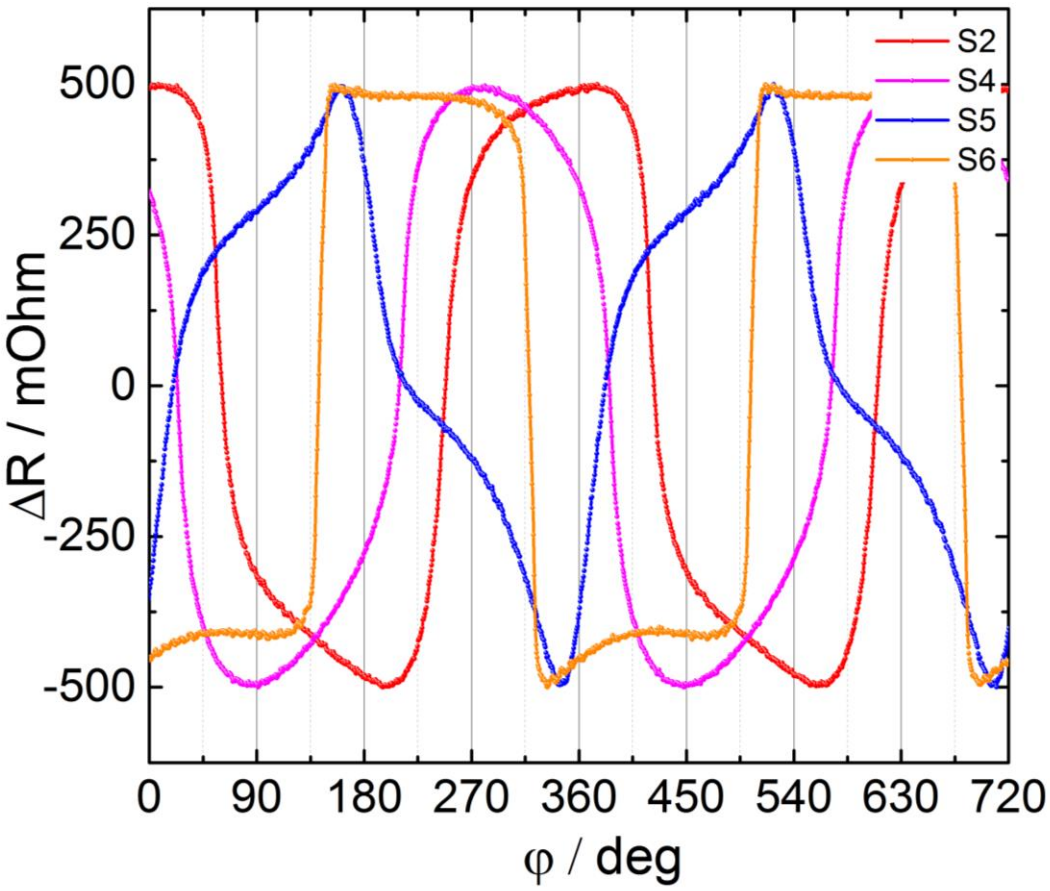

Fig. S2. Characteristic of the *XY* and *XZ* pairs (S2 and S4 and S5 and S6, respectively) of the orthogonal magnetic sensors formed on opposite sides of the respective tube with the field rotating in the *ZY* plane.

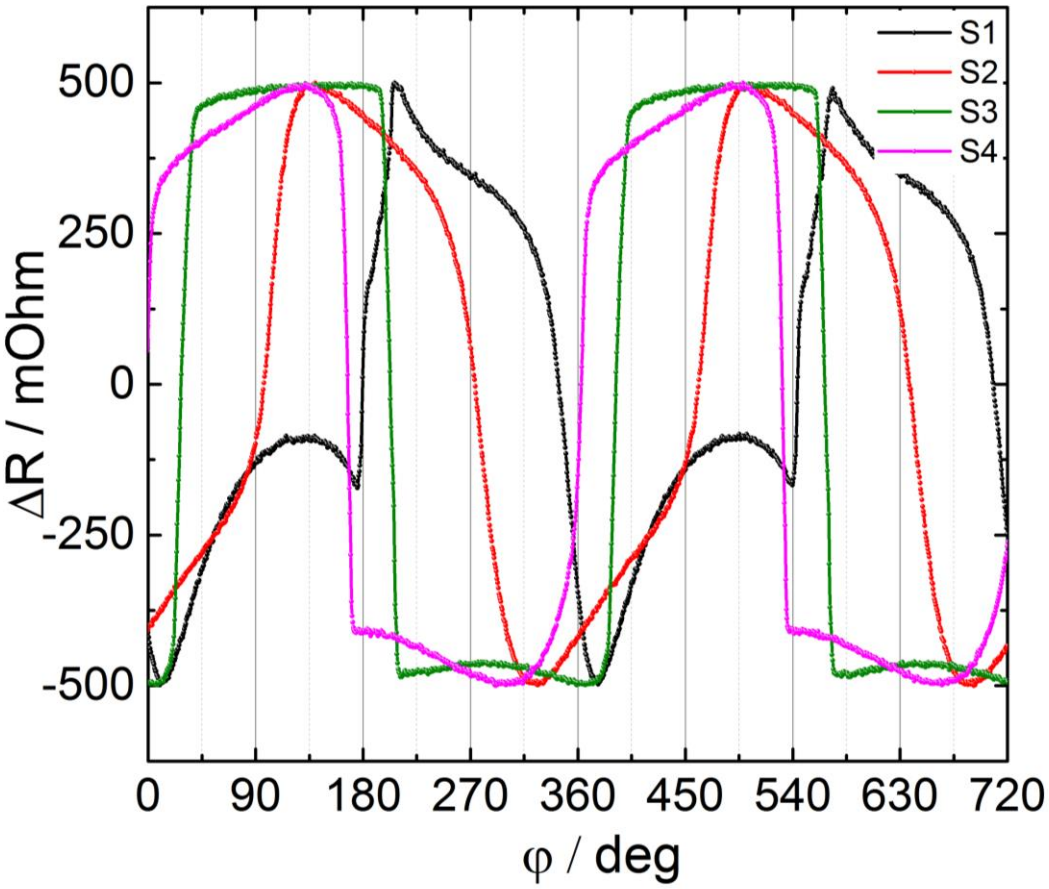

Fig. S3. Characteristic of the *XY* and *ZY* pairs (S2 and S4 and S1 and S3, respectively) of the orthogonal magnetic sensors formed on opposite sides of the respective tube with the field rotating in the *XZ* plane.

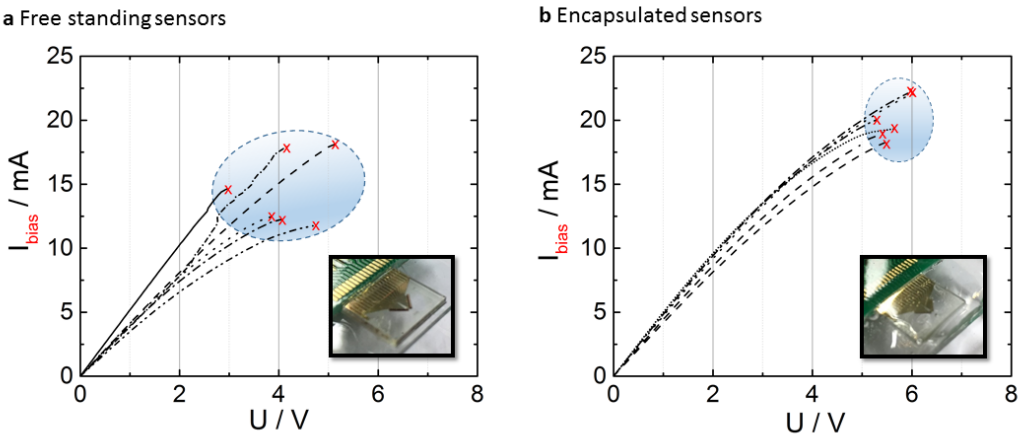

Fig. S4. Electrical breakdown of the sensors due to overheating under electrical stress. a, Breakdown of non-encapsulated sensors. **b**, Breakdown of encapsulated sensors. In both cases breakdown does not lead to mechanical deformation of the structure. Photos Credit: Christian Becker, Institute for Integrative Nanosciences Leibniz IFW Dresden.

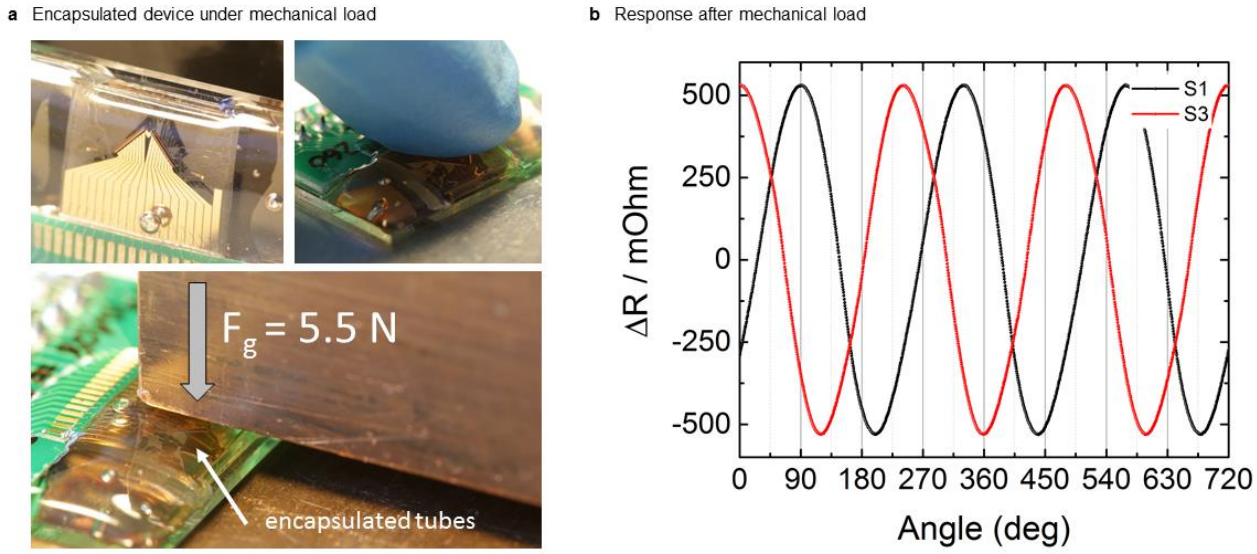

Fig. S5. Mechanical reliability testing of encapsulated devices. a, Encapsulated device (top left panel) with a finger loading (top right panel) and loading with a defined mass (bottom pannel) producing 5.5 N. **b**, Magentoresistive-response of S1 and S3 to a rotating magnetic field after mechanical loadings indicating no negative effect on the sensor performance. Photos Credit: Christian Becker, Institute for Integrative Nanosciences Leibniz IFW Dresden**.**