



US 20240237542A1

(19) **United States**

(12) **Patent Application Publication**  
**APALKOV et al.**

(10) **Pub. No.: US 2024/0237542 A1**

(43) **Pub. Date: Jul. 11, 2024**

(54) **PERPENDICULAR SHAPE ANISOTROPY  
DESIGN WITH ASYMMETRIC COMPOSITE  
FREE LAYER**

*H01F 10/32* (2006.01)

*H10B 61/00* (2006.01)

*H10N 50/85* (2006.01)

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(52) **U.S. Cl.**

CPC ..... *H10N 50/10* (2023.02); *G11C 11/161*  
(2013.01); *H01F 10/3286* (2013.01); *H10B*  
*61/00* (2023.02); *H10N 50/85* (2023.02)

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(21) Appl. No.: **18/116,835**

(22) Filed: **Mar. 2, 2023**

**Related U.S. Application Data**

(60) Provisional application No. 63/437,359, filed on Jan.  
5, 2023.

**Publication Classification**

(51) **Int. Cl.**

*H10N 50/10* (2006.01)

*G11C 11/16* (2006.01)

(57)

**ABSTRACT**

A perpendicular shape anisotropy magnetic tunnel junction structure includes a reference layer, a non-magnetic layer, and a free layer. The reference layer includes a first side and a second side that is opposite the first side. The non-magnetic spacer includes a first side and a second side. The first side of the non-magnetic spacer is on the second side of the first reference layer. The free layer includes a first side and a second side. The first side of the free layer is on the second side of the non-magnetic spacer. The free layer further includes a first layer on the first side of the free layer, a second layer on the second side of the free layer and a coupling layer disposed between the first layer and the second layer. A saturation magnetization of the second layer is between 2-5 times inclusive a saturation magnetization of the first layer.

