

Abstract Submitted  
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**Highly charged ion modified magnetic structures** HOLGER GRUBE, JOSHUA POMEROY, National Institute of Standards and Technology, ANDREW PERRELLA — Highly charged ions (HCIs) deposit large amounts of energy very locally in small areas of only a few square nanometers per HCI impact. This allows for the modification of nanometer sized areas and the creation of nano-sized features on impact surfaces. We have used highly charged ions such as  $\text{Xe}^{44+}$  to modify ultrathin oxide barriers in magnetic tunnel junctions (MTJs) in order to locally change their electrical properties. We have been able to drastically reduce the resistance area (RA) product of our Co/Al-Ox/Co MTJs. While the magnetoresistance of HCI modified MTJ is also reduced, we created a new hybrid magnetic field sensor composed of tunnel and metallic junctions. We have analyzed the properties of individual HCI created conduction channels through ensemble measurements. Generalizing this approach, HCIs can be used to create hybrid materials through the introduction of nanometer sized electric or magnetic channels. This could be a useful tool to probe materials properties and physics on the nanometer scale.

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