

# **Materials, microstructure, magnetism, and spin transport: the physics soup of recording heads**

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Disc drives are the work horses of non-volatile memory in computers, and recently they have started working their way into consumer electronics, such as MP3 players and video cameras. This has been enabled by a remarkable growth in storage density capacity of disc drives. This growth, in terms, has been enabled by new technologies used in the read and write heads, such as giant and tunneling magnetoresistive readers, new paradigms for recording, such as perpendicular recording, and ever-shrinking dimensions of read and write heads. I will in this talk first give a brief overview of disc drives and trends in disc drive storage ('Disc Drive 101') and then spend some time on tunneling magnetoresistive heads and perpendicular writers. In this, I will try to convey the breadth of and interplay between the physics, material science, and engineering challenges that go into making these devices, which, remarkably, you can go to Best Buy and purchase for the price of a toaster.