AUGER SURFACE ANALYSIS OF DEPOSITS FORMED ON MAGNETIC TAPE RECORDING HEAD SURFACES *

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The 2008 International Magnetic Tape Storage Roadmap[1] projects that the total magnetic spacing between the recording head and the magnetic layer on the tape must decrease from the current 43 nm spacing to about 23 nm by the year 2018 in order for tape to maintain its cost advantage as an information storage medium. Because tape drives are contact recording systems, interactions between head materials and components in the magnetic layer can affect the head-tape separation via deposit formation on head surfaces as well as preferential erosion of critical recording head elements. Understanding the nature of these interactions is therefore an essential prerequisite for mitigating undesirable increases in the magnetic spacing. This study shows that deposition and erosion phenomena can be varied *at the local level* in the same head by varying the electrical configuration of adjacent pole tip structures, and that the composition of the head deposits depends on the electrical configuration of the pole tips. Using atomic force and electric force microscopy, we show that conductive deposits form on the "trailing edge" of pole tips which are either shorted to earth ground or are electrically connected to the head substrate. The conductive deposits become nonconductive further "downstream" from the pole tips. Deposits downstream from electrically isolated poles are always nonconductive. Auger analyses show that the surfaces of the conductive deposit regions contain high levels of Fe, and Co, and small amounts of P and Y, whereas the surfaces of nonconductive deposits contain predominantly P and Y, with very low levels of Fe. Because all of these elements are present in the magnetic coating of the tape, and because the composition of the deposits on heads having NiFe pole tips is similar to deposits on heads having CoZrTa pole tips, these results suggest that the deposits originate from the tape and not from metallic structures in the tape head.

1. *International Magnetic Tape Roadmap*, Information Storage Industry Consortium, September, 2008.

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