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Fool's Gold Footprinting: microfluidic probing of nucleic acids<sup>1</sup> CHRISTOPHER D. JONES, Cornell University, School of Applied & Engineering Physics, JOERG C. SCHLATTERER, Albert Einstein College of Medicine, Department of Biochemistry, MICHAEL BRENOWITZ, Albert Einstein College of Medicine, LOIS POLLACK, Cornell University — We describe a microfluidic device containing a mineral matrix capable of rapidly generating hydroxyl radicals that enables high-resolution structural studies of nucleic acids. Hydroxyl radicals cleave the solvent accessible backbone of DNA and RNA; the cleavage products can be detected with as fine as single nucleotide resolution. Protection from hydroxyl radical cleavage (footprinting) can identify sites of protein binding or the presence of tertiary structure. Here we report preparation of micron sized particles of iron sulfide (pyrite) and fabrication of a microfluidic prototype that together generate enough hydroxyl radicals within 20 ms to cleave DNA sufficiently for a footprinting analysis to be conducted. This prototype enables the development of high-throughput and/or rapid reaction devices with which to probe nucleic acid folding dynamics and ligand binding.

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