



(12) **United States Patent**
Espy et al.

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(54) **HYPOTHESIS-DRIVEN CLASSIFICATION OF MATERIALS USING NUCLEAR MAGNETIC RESONANCE RELAXOMETRY**

(58) **Field of Classification Search**
CPC G01R 33/44
USPC 702/28, 194; 378/88; 250/310
See application file for complete search history.

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 575 days.

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(51) **Int. Cl.**
G01N 23/04 (2006.01)
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G01N 24/08 (2006.01)

(57) **ABSTRACT**

Technologies related to identification of a substance in an optimized manner are provided. A reference group of known materials is identified. Each known material has known values for several classification parameters. The classification parameters comprise at least one of T_1 , T_2 , $T_{1\rho}$, a relative nuclear susceptibility (RNS) of the substance, and an x-ray linear attenuation coefficient (LAC) of the substance. A measurement sequence is optimized based on at least one of a measurement cost of each of the classification parameters and an initial probability of each of the known materials in the reference group.

(52) **U.S. Cl.**
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16 Claims, 7 Drawing Sheets

