

Abstract Submitted  
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**Two measured completely different electron affinities for atomic Eu?** A. Z. MSEZANE, Z. FELFLI, Clark Atlanta University — Recently, the electron affinity (EA) of atomic Eu was measured to be 0.116 eV [1]. This value is in outstanding agreement with the theoretically calculated values using the Regge pole [2] and MCDF-RCI [3] methods. Previously, the EA of Eu was measured to be 1.053 eV [4]. In an attempt to resolve the discrepancy between the two measured values, we have adopted the complex angular momentum (CAM) method and investigated in the electron energy range 0.11 eV  $< E < 4.0$  eV the binding energies (BEs) of negative ions formed during the collision of an electron with atomic Eu as Regge resonances following Ref. [5]. We find the value of 2.63 eV as the EA of Eu. This leads us to conclude that neither the claimed measured EA of Eu correspond to the actual EA of Eu. We conclude that the EA in [1] corresponds to the BE of an excited (metastable) state of the Euanion and that in [4] to a shape resonance. We have also investigated the EA of atomic Nd and found the value of 1.88 eV, consistent with the measurement [6]. These significant EA values of Eu and Nd could be important in the use of their negative ions in catalyzing the oxidation of water to peroxide and of methane to methanol without CO<sub>2</sub> emission. These new results call for immediate experimental and theoretical verification. [1] S. -B. Cheng *et al.*, *Sci. Rep.* **5**, 12414 (2015) [2] Z. Felfli *et al.*, *Phys. Rev. A* **79**, 012714 (2009) [3] S. M. O'Malley *et al.*, *Phys. Rev. A* **78**, 012510 (2008) [4] V. T. Davis *et al.*, *J. Phys. B* **37**, 1961 (2004). [5] Z. Felfli *et al.*, *J. Phys. B*, Submitted (2015) [6] V. T. Davis *et al.*, *NIMB* **241**, 118 (2005)

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