

## **Abstract**

A large portion of today's layer-by-layer functional material is processed by utilizing a repetitive dip, rinse, and dry process. The process is time consuming, costly, and generates a lot of waste. Layer-by-Layer 3D printing of functional materials is a rapidly growing field that is replacing a lot of the old dip and rinse methods, which have been used for years to create functional materials. 3D printing offers a quicker, lower cost, less wasteful, and highly tunable way of manufacturing functional materials. 3D printing is an emerging technology that is currently being heavily researched as a cost effective alternative to producing functional materials.

Materials generated with 3D printers can be easily altered during the process, produced quicker at a lower cost, and generate no waste. Materials can be created with different coatings on each individual surface. Most materials require little to no post processing and are ready to be utilized after the printing process has been completed. Clay and polymer composites can be directly printed on different substrates to generate gas barriers and flame retardants to be used in different applications. The properties of the materials can be easily altered by adjusting the number of layers and percentages of each element used to generate the materials.

## **Biography**

Ray Cook

Ray is an engineer by trade who has spent the last nine years working in the Technology and Engineering departments at Texas State University. Before coming to Texas State, he spent ten years in the manufacturing industry working as an engineer, production manager, and facilities manager. Ray is currently working on attaining a Ph.D. in Materials Science, Engineering, and Commercialization from Texas State University-San Marcos. He is currently conducting research in Layer-by-Layer growth of functional materials utilizing 3D printers. His dissertation work will attempt to prove that 3D printers can be utilized to create functional materials cheaper and quicker, which can be utilized as gas barriers and flame-retardants in various applications.