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Peer Review

Review of: "Accelerating Manufacturing Scale-Up from Material Discovery Using Agentic Web Navigation and Retrieval-Augmented AI for Process Engineering Schematics Design"

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This paper proposes an autonomous framework to generate Process Flow Diagrams (PFDs) and Process and Instrumentation Diagrams (PIDs) by combining multi-agent web navigation with a Graph-based Retrieval-Augmented Generation (Graph RAG) method. The framework targets the automation of process design for industrial-scale material synthesis and supports open-domain question answering (ODQA) by organizing domain knowledge into ontological knowledge graphs. The proposed method is evaluated against fine-tuned and proprietary language models, highlighting its cost-effectiveness and potential applicability in resource-constrained environments. Please consider applying the following comments to improve the content of your paper.

- The paper does not clearly specify whether the final output is in textual or visual diagram format. Examples of the actual generated content (especially visual outputs) are necessary to validate the core contribution.
- Although the paper claims improvements in multi-hop reasoning through Graph RAG, there is no breakdown of performance across different reasoning categories or question types. More targeted analysis is needed.
- The study does not compare Graph RAG with models specialized in reasoning (e.g., GPT-4 Turbo, Claude 3), limiting the credibility of its claims regarding reasoning performance.
- While the paper compares Graph RAG with fine-tuned models, it does not explore combining Graph RAG with fine-tuned LLMs, which could be a more powerful and realistic configuration in practice.

Declarations

Potential competing interests: No potential competing interests to declare.

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