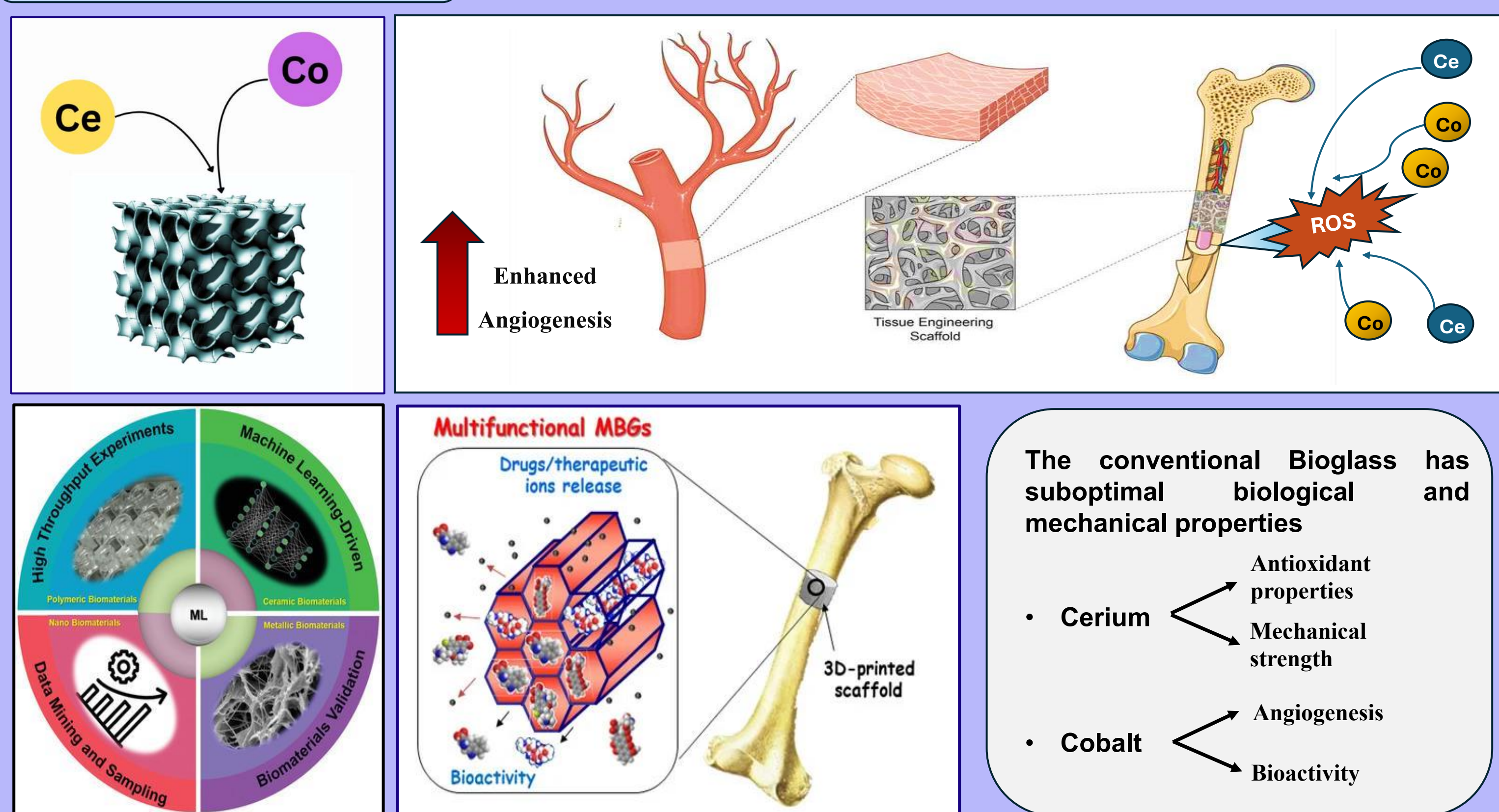
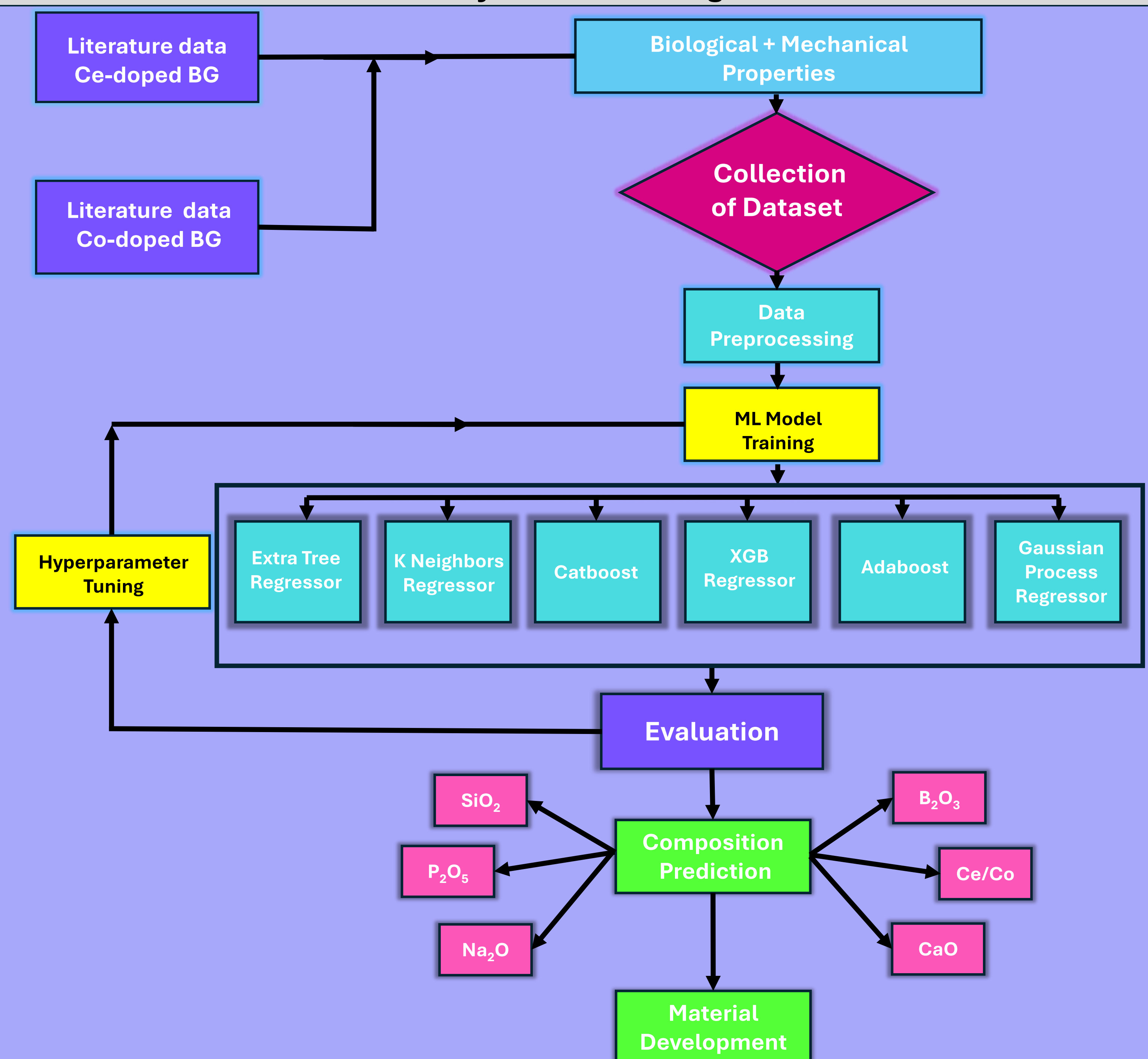


### Introduction



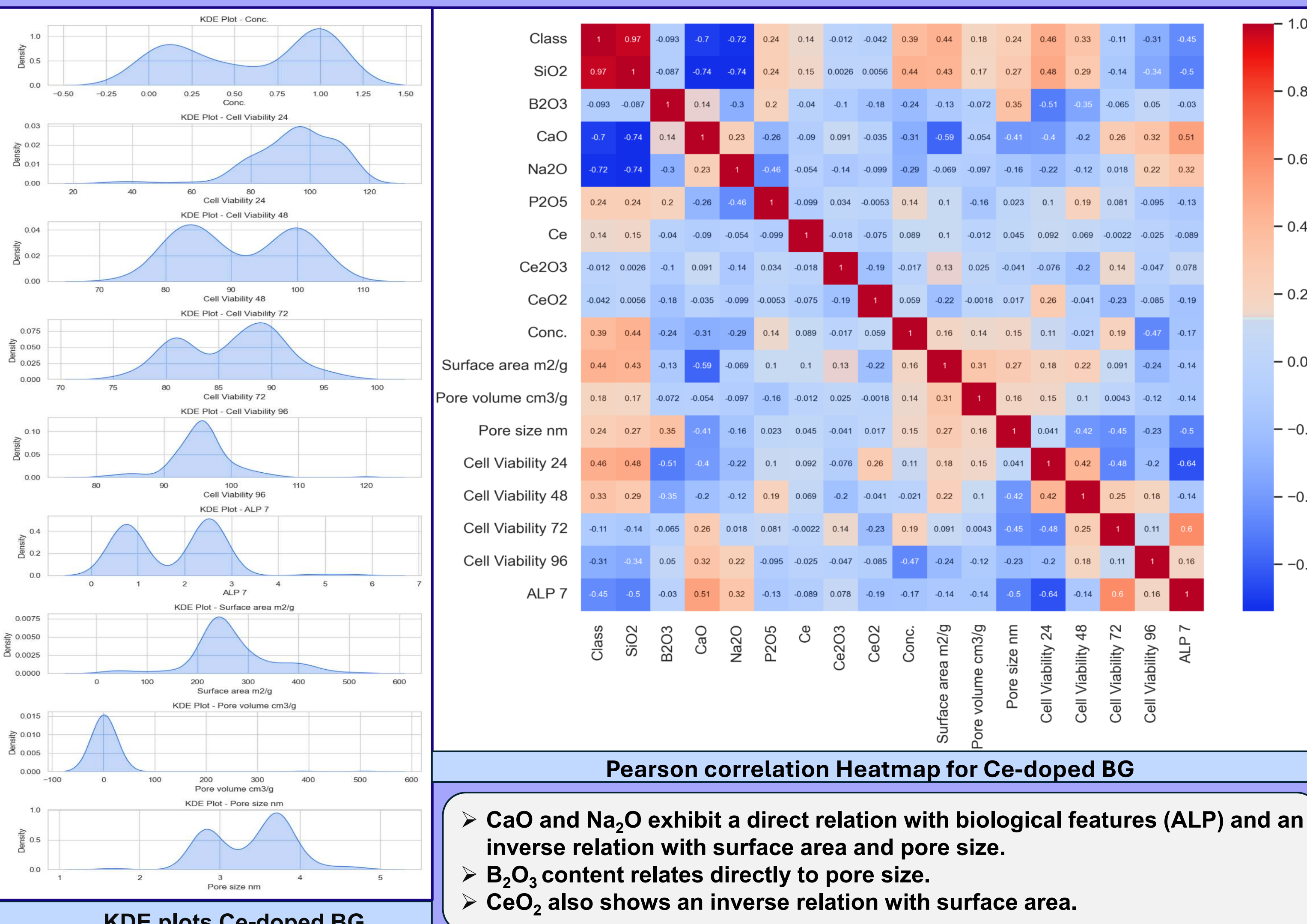
### Methodology

#### Study Workflow Diagram



### Results and Discussion

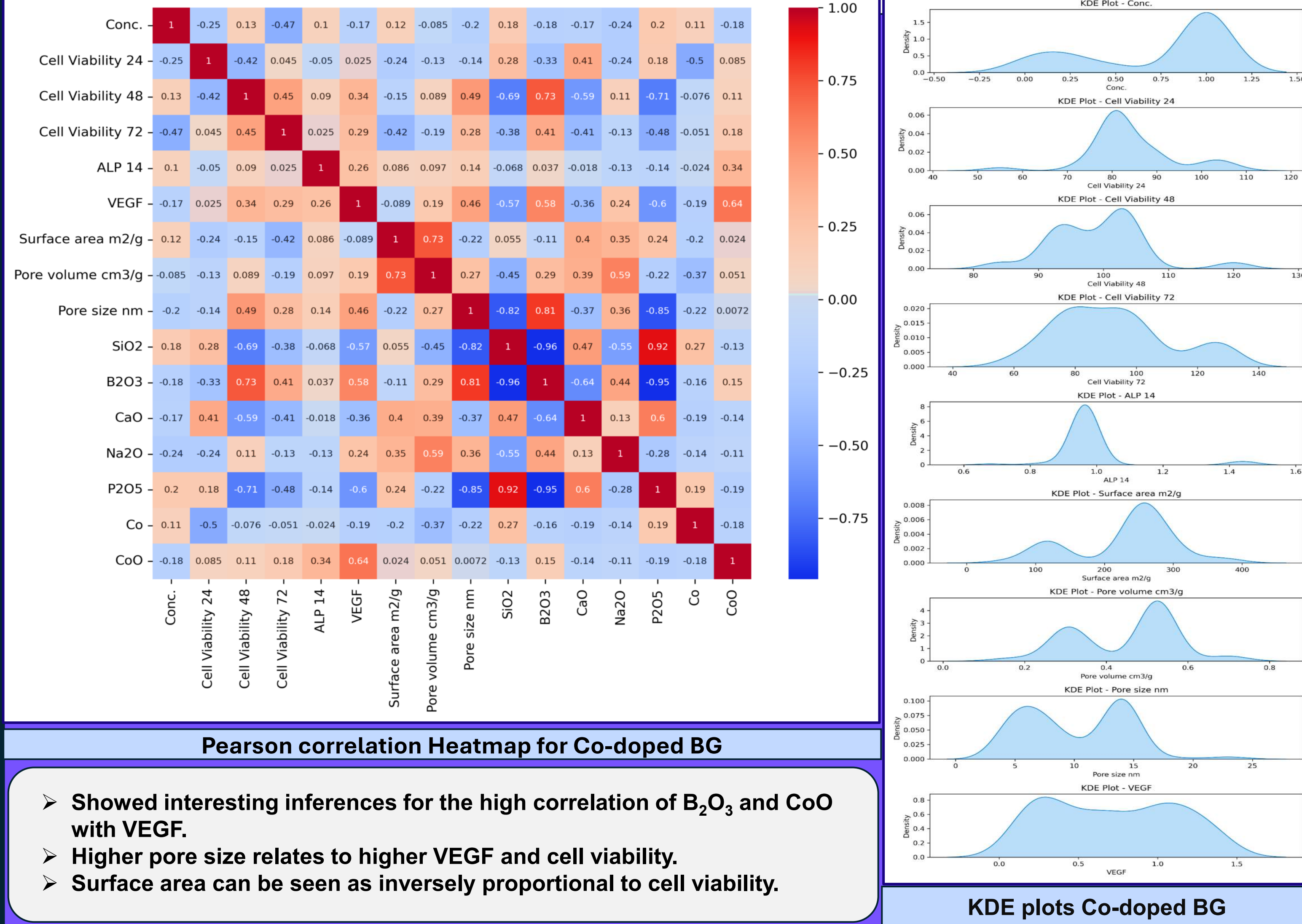
#### Distribution of Features & Targets present in the Dataset



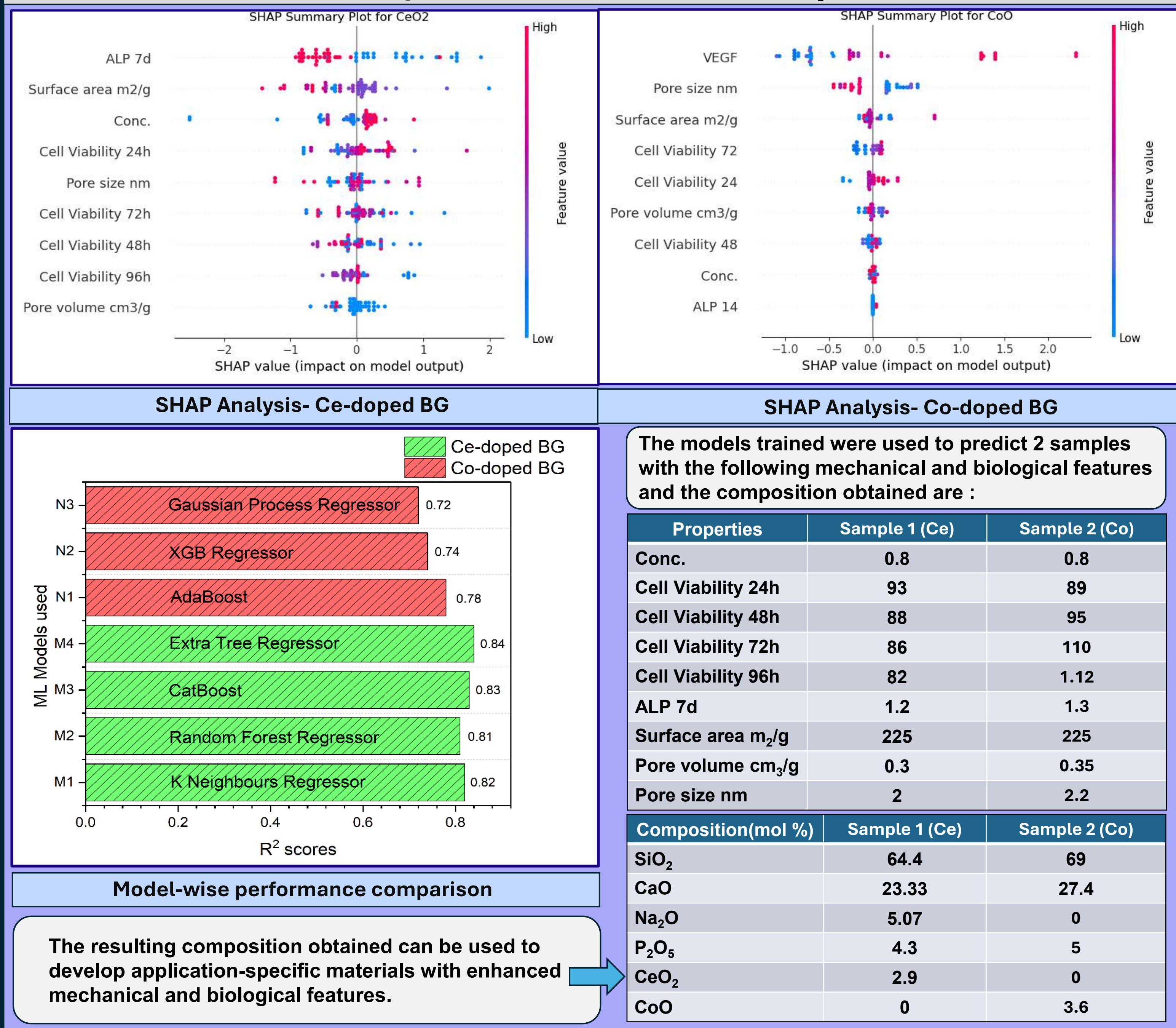
➤ CaO and Na<sub>2</sub>O exhibit a direct relation with biological features (ALP) and an inverse relation with surface area and pore size.

➤ B<sub>2</sub>O<sub>3</sub> content relates directly to pore size.

➤ CeO<sub>2</sub> also shows an inverse relation with surface area.



#### Dopants and Models Summary



### Conclusion

- Important variations in Ce or Co-doped BG activity on biological properties like cell viability, VEGF secretion, and ALP are mainly linked to the composition of BG and, in particular, to their content of Ce and Co ions.
- The performance of a Regression type ML model depends on its R<sup>2</sup> Score and RMSE.
- Extra Tree Regressor Model performed the best for Ce-doped BG and AdaBoost performed the best among all the models trained for Co-doped BG with an R<sup>2</sup> Score of 0.84 and 0.78 respectively.
- The trained model can now give the composition of Bioglass with Ce and Co of desired properties.

### Future Scope

- Assess the material compositions predicted by the ML model by comparing them with original samples and evaluating their biological and mechanical properties.
- Integrate the current developed model with antibacterial properties in future studies.
- Aim to develop a multifunctional material based on Bioglass by combining biological, mechanical, and antibacterial properties.

### Acknowledgement

- ✓ Supervisor Prof. Kantesh Balani
- ✓ Project - Mentor Murli Manohar
- ✓ Head, MSE Department
- ✓ All the staff of the Library, MSE Department
- ✓ Staff and Colleagues of BPCL Lab

### References

- ✓ M.M. Echezarreta-Lopez et al. International Journal of Pharmaceutics (2013)
- ✓ Maria Vallet-Regí et al. Pharmaceutics (2022)
- ✓ Shota Horikawa et al. Materials(2024)
- ✓ Ady Suwardi et al. Advanced Materials (2021)

