Budget Justification

A. Senior Personnel: $43,769 TOTAL

Per Chapter II.C.2.g(i)(a), of the FY2020 PAPPG (Senior Personnel Salaries & Wages Policy), the Regents of the University of Idaho have determined the definition of salary year to be based on a calendar year.

PI Waynant will be the primary project contact, will manage reporting, mentor a Post-Doctoral Researcher (PDR) in Chemistry and will lead the custom cross-linker and peptide coupling experiments and synthesis efforts. PI Waynant will also be the main developer and instructor for the teacher workshops and work with the PDR, graduate student, and summer undergraduate students to develop the activities and kits for participants. Waynant has a standard nine-month appointment with the University of Idaho, with a salary rate of $72,462. Waynant is requesting 1.00 months of summer salary for all 3 years with a 2% cost-of-living increase each year. PI Bernards will lead the efforts to develop the polymer platform hydrogels that integrate biological and chemical technologies. He will mentor a graduate student and he will coordinate the material characterization efforts and analyze the structure property relationships for these hydrogels. Bernards has a standard nine-month appointment with the University of Idaho with a salary rate of $121,883 and is requesting 0.50 months of summer salary for all 3 years with a 2% cost-of living increase each year.

B. Other Personnel: $187,865 TOTAL

Post-doctoral Researcher. $90,900 is requested to support one 12-month 1.0 FTE Post-doctoral Researcher (PDR) to be housed in the Department of Chemistry. The PDR will have a 2-year appointment during YRs 1 and 2 and a 2% raise in YR2. The PDR will lead the synthetic efforts to create new cross-linkers and then look to scale up and optimize multi-gram quantities of cross-linkers. The PDR will be mentored by PI Waynant (see PDR mentoring plan) and will be supported towards their career development as much as their research.

Ph.D. Student. $81,965 is requested to support one 12-month 0.5 FTE Graduate Research Assistantship, which will be housed in Chemical and Biological Engineering for all 3 years of the project. The beginning rate of pay for the students is $26,000 with annual 2% increases.

Undergraduate Summer Student: $15,000 is requested to support one summer undergraduate student for each summer of the project to help the Postdoc, graduate student, and PIs develop research strategies. These students will be shared amongst the project team in collaborative efforts. The students will be paid at a pay rate of $12.50/hr for 40 hrs over 10 weeks (400 hrs).

C. Fringe Benefits: $55,473 TOTAL

The University of Idaho FY23 fringe rate agreement was submitted to DHHS in December 2021 but has not yet been approved by DHHS. If selected for funding, if the rate agreement is not approved at the time of award, the approved (not projected) rates will be utilized.

At the University of Idaho, fringe benefits are 30.1% for the two PIs, 42% for the Post-doc, 3.6% for graduate students and 7.8% for summer undergraduate students.

D. Equipment: $25,000 TOTAL

A Labconco 2.5L Freezone –84˚C lyophilizer, an 8-port manifold, a rotary vane vacuum pump, and lyophilizer glassware are requested to purify the cross-linkers following deprotection and prior to hydrogel incorporation. Many of the deprotection steps utilize trifluoroacetic acid and we'd like to lyophilize these cross-linkers in a weak hydrochloric acid solution (25 mM) as to both ion exchange the trifluoracetate ion as much as prepare the cross-linkers for aqueous polymerization conditions.

The PI has discussed multiple systems with representatives from Labconco for basic needs and has a quote from the supplier (VWR) for the required setup.

E. Travel: $23,015 TOTAL

E.1 Domestic travel
The team requests travel costs for PIs, Post-doc, and graduate students to attend and present research findings at one domestic national conference each year of the award (eleven total trips). Travel estimates are expected to increase 5% per year. Note: only 3 trips in YR 3. 11 trips total.

Cost/trip
Each trip is budgeted at $2,000 (year 1):
Nights/Days: 5/5
Lodging: $200/night * 5 nights = $1,000
Per diem: $60/day * 5 days = $300
Airfare: $700

F. Participant Support Costs: $12,155 TOTAL
Participant support is requested for the teacher workshops as indicated in the Broader Impacts section of the proposal. Each summer of the project six (6) teachers will be recruited, with an emphasis on rural or underserved populations, and taught a variety of aspects related to polymer hydrogel interfaces. Each teacher will receive a "toolkit" of hydrogel materials to take back to their classroom (these materials are mentioned below in section G.1). As per NSF Participant support costs:

- Stipends - Each teacher will be paid a $300 stipend for their time totaling $5,400 over the project.
- Travel - $200 per teacher has been budgeted for the two-day workshops based on a $100/night hotel fee. The hotels costs are estimated to increase by 5% each project year.
- Subsistence - $50 per day will be provided in per diem for the two-day workshop totaling $100 per teacher. The per diem will also increase by 5% each year of the project.
- Other - Each teacher will receive professional development credit for their participation in the workshop. The University of Idaho has a set price of $60 per credit for professional development from the Dept. of Education and one credit will be purchased for each teacher totaling $1,080 over the entire project.

G. Other Direct Costs: $108,645 TOTAL

G.1 Materials and Supplies: $63,078 TOTAL

Material and Supplies: $40,000 in funds are requested to purchase lab supplies for peptide and cross-linker synthesis and hydrogel fabrication including: amino acids, buffers, reagents for hydrogel synthesis, pH probes and sensors, various analyte probes, specialty chemicals for polymer modifications, glassware, consumables, and solvents. These funds are also requested for consumable laboratory supplies associated with cell culture and biological analysis including: MC3T3-E1 cells, cell stains, standard cell culture media reagents (Dulbecco's Modified Eagle Medium, fetal bovine serum, and penicillin-streptomycin), chemical inhibitors, ethanol, pipettes, petri dishes, centrifuge tubes, filters, and phosphate buffered saline. A categorical breakdown of anticipated materials and supplies is shown in Table 1.

Table 1: Materials and Supplies Breakdown

Items	Budget

GENERAL CONSUMABLES: gloves, pipets, filters, glassware, TLC plates, kimwipes, gases, etc.	$4,000
HYDROGELS: monomers, buffers, NaOH, etc.	$10,000
CROSS-LINKER SYNTHESIS: solvents, amino acids, specialty reagents, silica for flash chromatography, resins for SPPS, glassware, etc.	$20,000
CELL CULTURE: culture media, fetal bovine serum, colorimetric assays, fluorescent stains, etc.	$6,000

Teacher Supply Kits: $7,200 is requested to purchase chemicals and supplies for the local school-teacher workshop kits and provide them with laboratory equipment necessary to complete the proposed project as indicated in the Broader Impacts. Each kit will consist of $400 worth of supplies for 6 teachers each year over the 3 years.

G.2 Publication Costs: None requested

G.3. Contracted Services: None requested

G.4. Computer Services: None requested

G.5. Subcontract: None requested

G.6. Other Direct Costs:

Tuition/Fees/Health Insurance: $40,067 is requested for graduate student tuition, fees, and insurance. Expected tuition and fees for graduate students at the University of Idaho are based on the current 2022-23 tuition rate of $5,203/semester, with an estimated increase of 2% per year. Funds are requested to cover the tuition of the 1 Ph.D. student for all 3 years. An additional research credit is needed for the Ph.D. student for the summer with a current rate of $549 and an annual increase of 2% each year over the duration of the project. Health insurance will also be provided for the Ph.D. student. Insurance estimates are based on the current 2022-23 rate of $2,385, with an annual increase of 2% each year.

Instrument Use: $15,878 in funds are requested for use of the University of Idaho's Optical Imaging Core (OIC), NMR Spectrometer Suite, and Mass Spectrometry Core Laboratory. Confocal microscopy in the OIC currently costs $900/quarter and there is an assumed 5% increase each year. OIC funds will be focused in years 2 and 3. NMR charges are currently $7.50/hr and we assume 150 hours of sampling for project years 1 and 2 with a 5% increase each year and 75 hours of NMR time in year 3. Mass spectrometry core rates are currently $40/sample and we assume 50 samples each project year with an assumed annual 5% increase.

Conference/Workshop Registration Fees: $5,500 is budgeted for conference/ workshop registrations for the requested travel ($500/conference). 11 conference/workshops are requested.

H. Total Direct Costs: $455,923 TOTAL

I. Total Indirect Costs: $189,350 TOTAL

Indirect costs are calculated on the modified total direct cost base (MTDC), which excludes graduate student tuition and healthcare, equipment over $5000, and participant support. The UI Federally

Negotiated Indirect Cost Rate is 50% for on-campus research. The indirect rate on the MTDC for this proposal results in $189,350 in indirect costs.

J. Total Direct and Indirect Costs: $645,273 TOTAL

L. Amount of This Request: $645,273 TOTAL